

A SYSTEM OF SYPHILIS

EDITED BY

D'ARCY POWER

AND

J. KEOGH MURPHY

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A SYSTEM OF SYPHILIS

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IN SIX VOLUMES

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AND

J. KEOGH MURPHY, M.C. CANTAB., F.R.C.S.

WITH AN INTRODUCTION

BY

SIR JONATHAN HUTCHINSON, F.R.S.

VOL. VI

- INTRODUCTION SIR ALFRED KEOGH, K.C.B., LL.D.
(*Hon. Causa*).
THE HISTORY AND EPI- C. H. MELVILLE, Lieut.-Colonel R.A.M.C.
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IN THE ARMY
NOTEWORTHY FEATURES C. N. FISKE, M.D. (Harv.), Surgeon United
OF SYPHILIS IN THE NAVY States Navy
OF THE UNITED STATES
OF AMERICA
EPIDEMIOLOGY OF SYPHI- E. P. MOURILYAN, Fleet Surgeon R.N.
LIS IN THE ROYAL NAVY
THE PRACTICAL TREAT- CHARLES K. BUSHE, M.D., Staff Surgeon
MENT AFLOAT OF SYPHI- R.N.
LIS IN THE ROYAL NAVY
THE VALUE OF JUSTUS' W. P. YETTS, Staff Surgeon R.N.
TEST IN THE DIAGNOSIS
OF SYPHILIS

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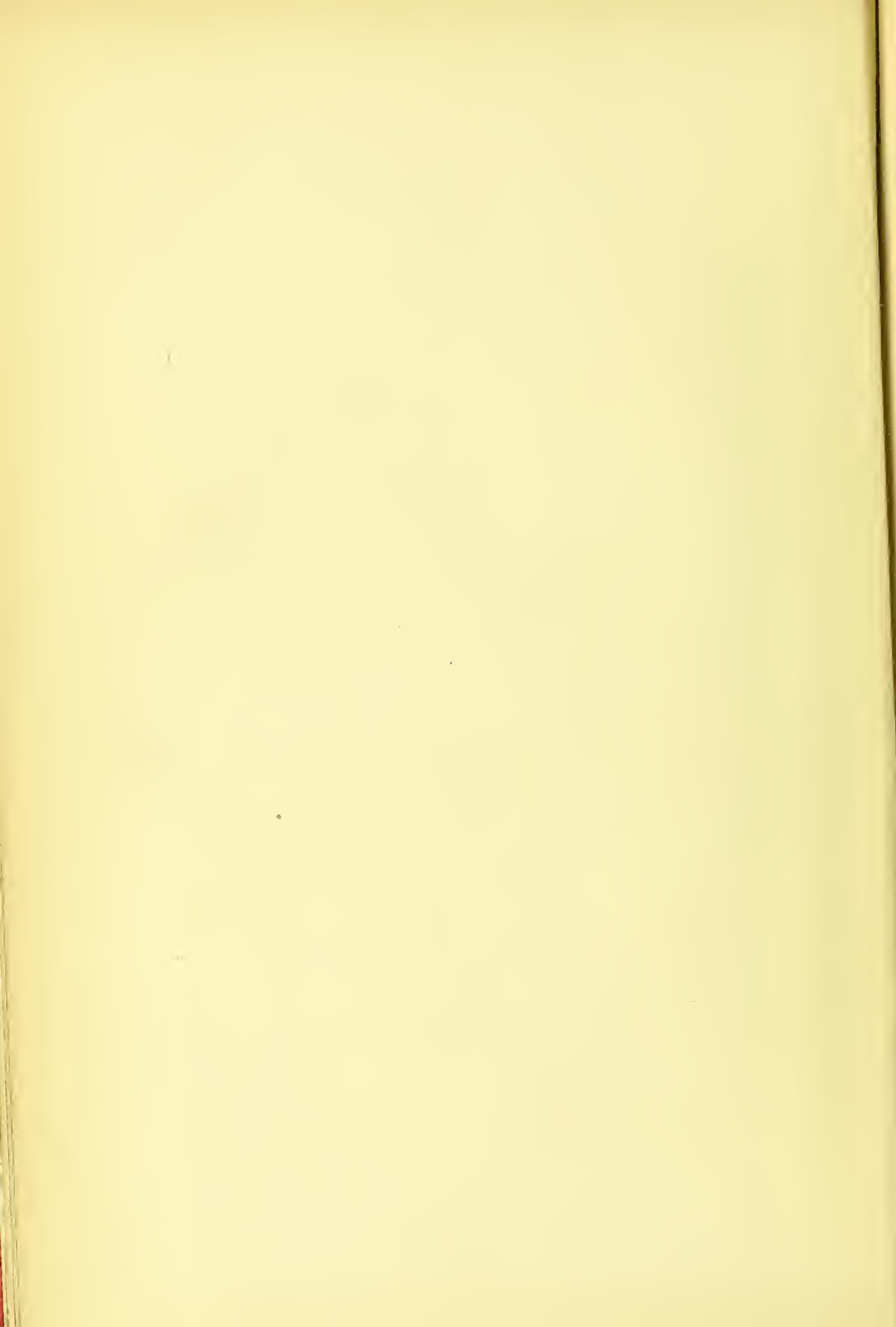
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EDITORS' AFTERWORD

THE present volume brings this System of Syphilis to a conclusion. The work bears witness to the extraordinary manner in which a single microbic infection has affected the body politic throughout the world, as well as each individual to whose tissues the *Spirochaete pallida* has gained access. The task of producing the System has been one of considerable magnitude, and, in bringing it to a conclusion, the Editors desire to thank those Contributors who have kept faith with them ; the Publishers, who have assisted them in every possible way, sparing no expense in the production, and especially in perfecting the new methods of direct colour photography ; and the critics, whose kindly comments have pointed out weak spots and amendments for future editions. The elaborate scheme of illustration has necessarily delayed the appearance of one or two of the volumes, but it was thought better to wait than to court failure by too hasty a preparation of the coloured plates. Attention has been called by some of our critics to the amount of repetition in the work when considered as a whole. This appeared to the Editors to be unavoidable, as it was necessary to make each volume as far as possible complete in itself ; moreover, each article represents the individual and mature judgement of its author, which has sometimes differed from that of other eminent authorities whose conclusions had already been given.



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INTRODUCTION

BY

SIR ALFRED KEOGH, K.C.B., LL.D. (*Hon. Causa*)

*Rector, Imperial College of Science and Technology, Kensington, and late Director-
General of the Army Medical Service*

INTRODUCTION

It is very fitting that in a system dealing with the subject of syphilis one volume should be devoted to a consideration of that disease as it affects the naval and military services. The first appearance of syphilis in military history coincides with the campaign of Charles VIII of France in Italy, and its dissemination through the Continent was largely due to the subsequent dispersion of the mercenary soldiers of which so large a portion of his army consisted. Later epidemic outbreaks of this scourge have originated, as Hirsch shows, with the invasion of districts, in which it was previously unknown, by the infected soldiery of foreign powers. But quite apart from this historical interest, the relation of syphilis to the life of the sailor and the soldier is one of the greatest importance. It may be stated without fear of contradiction that there is no disease, with the possible exception of malaria, that has so important an influence on the efficiency of an army or a navy as syphilis. Other diseases doubtless are more deadly, and consequently attract more attention, no other is so lasting in its effects, nor so persistent in its attack on the bodily strength of the man who has once acquired it. A soldier gets enteric fever and either dies or recovers. Out of a hundred such it may safely be prophesied that eighty will survive, and of these, seventy, at least, be not only none the worse for their experience, but eventually all the more efficient for field service in consequence of it. To use a familiar South African expression, they will be 'salted' and free from further danger in that direction. On the other hand, thirty men get syphilis, and not one of these can ever be considered the man he was before. Of each of them one might almost say 'Haeret lateri letalis harundo'. Treatment may do much, and of late years has done a great deal to minimize the severity of the later manifestations of syphilis. We do not now meet with the mutilations and disfigurements, of which examples can still be

seen in our museums, and which, within the memory of most officers on the active list, were still not unknown in our hospitals. These worst manifestations of the disease have vanished, it is to be hoped, permanently. By persistent treatment of each individual patient, by constant watchfulness to see that his general health is maintained, and his resisting power to disease is in no way lowered, we can almost ensure that the secondary symptoms shall be slight, in some cases even that they shall never appear. But he would be a bold man indeed who would confidently predict, in any particular case, even though no sign of the disease had been seen for six months, that the spirochaete was not still dormant in the tissues, waiting only for some one of the thousand inevitable accidents of field service, cold, hunger, thirst, or other hardship, to lower the resisting powers of its host, and reappear in all its original virulence. Absence of symptoms is taken, and has to be taken, since we at present have no other guide, as affording a presumption of permanent cure, the more reliable the longer the period during which they have been in abeyance. But still it is only a presumption, by no means a certainty. In time perhaps the more accurate method of investigation, which we associate with the name of Wassermann, may furnish us with a more reliable means of prognosis. So far, it is true, the information gained in this manner seems to point to an even more prolonged persistence of infection than we have been in the habit hitherto of recognizing. However this may be, it remains an undoubted fact that syphilis has a greater influence on the physical efficiency of the individual soldier, and, therefore, of the army as a whole, in war than any other one of the class of infectious diseases. I have excepted malaria, but the group of infections that goes under that name has a definite geographical distribution, whereas syphilis recognizes no limitations of place or climate. Syphilis should therefore, more than any other disease, claim the attention of the naval or military surgeon. Unfortunately this has not always been the case. I am not, I think, going too far when I say that this disease—and also its congeners, the venereal infections in general—was for long looked on as an uninteresting complaint. We seemed to have, or at least we

thought we had, learnt all there was to be learnt about its pathology and treatment. The latter was summed up in the word mercury. Using this drug, there was rarely any difficulty in curing the temporary manifestations of the disease, and unfortunately as little uncertainty in anticipating an inevitable reappearance of the same or some new symptom. Diagnosis was easy, treatment was simple, and recurrence almost inevitable. The venereal wards of a hospital were relegated to the junior or less energetic officer. The ambitious man strove to be placed in charge of the surgical cases, or if his bent were in another direction, of the wards where the perennially exciting struggle with tropical diseases or enteric fever was in progress. But now all this has changed. The treatment of syphilis has been recognized as no less a matter for scientific therapeutics than the treatment of any other protozoal disease, and it would be safe to say that in the Royal Army Medical Corps some of the keenest and most able pathologists, and some of the most scientific clinicians, are to be found in the erstwhile despised venereal department. This change has resulted from the efforts of more than one officer, but it is impossible to refrain from connecting it conspicuously with the name of Colonel Lambkin, to whose persistent advocacy of continuous treatment so much of the present advance has been due. Credit must also be paid to the Advisory Board for Army Medical Services, which, in 1903, appointed a committee to investigate the whole question of the treatment of venereal diseases. This committee did a great deal to systematize treatment, in the case of gonorrhoea as well as syphilis, and to them must be given the credit of formulating a definite plan for the construction of venereal treatment blocks, a step which has assisted very greatly in the scientific treatment of these diseases. No one who, like myself, remembers the appalling prevalence of syphilis in our Indian army, more especially in the '90's of last century, can fail to look with satisfaction and pride on the curves showing the admission rate for this complaint in the last twenty years. The fall in these curves is one of the most startling facts in military epidemiology, not only of late years but for as far back as we can look. The only other occurrence of a similar nature that we can compare with it is the virtual

disappearance of Mediterranean fever from Malta. It can but seldom be the case that the bacteriologist and the sanitarian working together shall be able to abolish a disease, as was done in that instance, as completely and as suddenly as a man obliterates the record on a slate. Such fortunate events must always be rare, and the fight with syphilis has not yet furnished us so dramatic a success. But the partial victory that we have attained is in its way almost as striking, as it undoubtedly is more creditable to the officers of the Royal Army Medical Corps, and to the rank and file of the army. It is a victory that has been gained by persistent and ungrudging effort on the part of the former, and by the observance of a higher ideal of conduct by the latter. It has often been brought as a reproach against the armies of the two English-speaking peoples that the incidence of venereal disease is higher in them than in the armed forces of any of the Continental nations; and inferences have been drawn as to the discipline and morality of the Anglo-Saxon soldier in comparison with soldiers of the Teutonic and Latin races. Those who make this comparison forget the paramount influence exerted by systems of enlistment, rates of pay, and the thousand and one other minor accidents that regulate the incidence of syphilis and the other members of the group. Be that as it may, the British soldier is rapidly wiping off the reproach, and showing that he can be trusted with more spare cash, and greater leisure, and still suffer but little more from the diseases to which leisure and a full purse are the chief inducements, than his more tightly reined brother on the Continent. The change in the past ten years has been so great that we are justified in hoping for even better things in the future. On the Continent, as is well known, it is the custom to impose police supervision on the unfortunate women who, in the old Scotch phrase, 'make market of their bodies.' In the British Isles this is not done. It was once tried, partially only, it is true, but the moral sense of the nation revolted, and rightly, against the system. Those who were in favour of the continued enforcement of the Contagious Diseases Acts prophesied the most terrible evils as the inevitable consequences of their withdrawal. For a few years, more especially in India, it seemed

as if these forebodings were likely to be fulfilled. The immediate result of the removal of restrictive measures is not unlikely to be a temporary increase of disease, but there is nothing more certain—the experience of Continental nations is proof of this—than that the severest measures of police supervision cannot touch anything but the fringe of the mass of women who indulge in illicit sexual commerce. The clandestine prostitute will always evade their mesh, and it is to her that the greatest amount of disease is due. If Contagious Diseases Acts were successful they might be justifiable, degrading as the execution of their provisions must be to the police that have to enforce them, and the medical men who have to carry out the examinations they prescribe. That they are not successful the experience of the Continent proves. Venereal diseases of all kinds still prevail in Paris and Berlin amongst the civil population, and there is not the slightest reason to believe, nor do I think any one has ever attempted to prove, that they are less frequent there than in London or Edinburgh. For good or for evil, Great Britain has taken up the line that there shall be no invidious regulation discriminating against one sex only where both are equally guilty, if indeed the man be not often the more guilty of the two, and no discrimination between the rich and the poor, the notorious result of all restrictive regulation. That the decision has been taken for good I steadfastly believe. We can point to the statistics of our army to prove it, and I also believe that the experience of future years will show that the improvement which has already taken place is only an earnest of the greater improvement that is destined to follow; an improvement firmly based on a higher ideal of conduct, and a cleaner method of life, not on an acceptance of evil as a necessity, and an attempt to undo its effects by a superadded injustice.

Leif K. K.



THE HISTORY AND EPIDEMIOLOGY
OF SYPHILIS IN THE MORE
IMPORTANT ARMIES

BY

LIEUT.-COLONEL C. H. MELVILLE,
Professor of Hygiene, Royal Army Medical College

CHAPTER I

INTRODUCTION

THE writer of a history of Venereal Diseases, more especially if he try to limit himself to the study of any one form of disease, is confronted with many difficulties. More especially is this the case when the disease selected is one of such a protean nature as syphilis. In the earlier days of the prevalence of this disease its course was so rapid and its virulence so extreme that its progress through Europe can be traced with comparative certainty, but it is not long before this certainty is lost. By the middle of the sixteenth century, at the latest by the beginning of the seventeenth, syphilis has come to be confused not only as regards its primary manifestation with simple venereal ulcer, but as regards its later symptoms with a host of skin and bone affections. It follows from this that after the clear records of the earlier years, the last decade of the fifteenth and the first two or three decades of the sixteenth century, no well-defined narrative of the progress of this disease can be made out. Scattered notices there are, here and there, in the books of military surgeons, but these refer more to treatment than incidence, to the therapeutic rather than to the epidemiological aspect of the disease. Until the end of the eighteenth century vague references alone are to be found, but with the wars of the latter half of that century we come to more detailed accounts, with some attempt at statistical record. The value of these last is much discounted by the fact that, as a rule, all venereal diseases are lumped together. In addition, where the strength of the troops concerned is given, this figure is probably not an accurate annual average but the muster strength on a certain day. It is not, in fact, until well on in the nineteenth century that any reliable statistics are to be found, and even then doubt as to the accuracy of the diagnosis remains until comparatively recent years. It would be more charitable, and indeed more scientific, to speak of 'uniformity' of diagnosis rather than 'accuracy'. The effect is the same when we come to consider a long series of statistics. Whether by defect of knowledge on either side or not, there is no certainty that the medical officer of 1860 means the same

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disease entity as his successor of 1909 when they both use the same expression 'Primary Syphilis', less still when the term used is 'Syphilis' unqualified. In fact the presumption is all the other way. The two men are talking a different language. In considering, therefore, a curve showing the admission rate for syphilis over a long term of years this fact must be borne steadily in mind. Such a curve has a value merely as showing a general trend in the prevalence of the disease, and must not be read too closely. Another fallacy is introduced into such a curve by the effect of administrative measures on the admission rate. The effect of the 'out-patient' system of treatment is obviously to lower the number of admissions to hospital. Methods of treatment also have a marked effect. Greater efficiency of treatment means fewer cases of recurrence. Treatment by intramuscular injection, apart from any question of its greater efficiency, reduces the number of men in hospital by facilitating their treatment while they still perform their duty. So far I have been speaking only of fallacies affecting the statistics of individual armies. When we try to compare different armies with one another the difficulties are even greater. Varying methods of recruiting, different rates of pay, the greater or less amount of physical work demanded of the private soldier, and the social prestige accorded to him, all these affect the prevalence of syphilis and other forms of venereal disease. These of course are superadded to the effects of different systems of hospital administration, &c. It is not, therefore, possible to compare accurately the incidence of disease in any two armies on the basis of the figures representing the admissions to hospital on account of syphilis in each, much less possible is it to compare these armies in the light of any deductions that may be drawn from these figures.

The history of syphilis in relation to armies may be divided into four periods, distinguished from each other by the varying amount of attention paid to the epidemiological aspect of the disease, and the views obtaining from time to time with reference to diagnosis, and statistics. The first period corresponds to the original outbreak of syphilis in the army of Charles VIII, and its subsequent spread through Europe, and may be said roughly to extend from 1493 to the middle of the sixteenth century. Next comes the era of general memoirs with vague and scanty allusions to the disease; this extends to about the close of the Napoleonic wars, the allusions becoming more definite and circumstantial towards its termination. The third period may be said to extend from 1815 to 1860. During this period we can

obtain for some armies at least 'figures', which though hardly to be reckoned as 'statistics' in the sense in which we understand that word nowadays, still do supply us with a certain amount of definite information. Lastly comes the period of accurate statistics, from 1860 to the present date. Here our only difficulties lie, as already hinted, in a want of uniformity in diagnosis and the effect of administrative and therapeutic changes, taking place from time to time in the services. The bibliography of the history of syphilis is enormous and I have appended short lists of authors only. Astruc is, of course, indispensable, and affords a unique compendium of the views of the men first brought into contact with the disease. The best account of the great outbreak of 1493, and of the campaign of Charles VIII, is to be found in Hesnaut. Of modern writers I must acknowledge my indebtedness chiefly to Dr. Iwan Bloch. For the later statistics of the disease the most reliable authority is Dr. Heinrich Schweining in his *Beiträge zur Kenntniss der Verbreitung der venerischen Krankheiten in den europäischen Heeren*, which forms Part XXXVI of the official *Veröffentlichungen auf dem Gebiete des Militär-Sanitätswesens*, published by the Prussian War Office. More detailed information can be procured, as regards other armies than the Prussian, from the different official annual reports, particularly those of the British, American, French, and Austrian armies. As regards prevention, much information is to be obtained from the reports of the various Parliamentary Committees, and Royal Commissions, that have, from time to time, met to consider the question of the operation of the Contagious Diseases Acts. The *Comptes rendus* of the two International Conferences held at Brussels in 1899 and 1902 are also storehouses of information, and of varying opinions, on this much-debated question.

CHAPTER II

THE ADVENT OF SYPHILIS INTO EUROPE. ITS SUBSEQUENT SPREAD

THE origin of syphilis in Europe is one of the classical battle-fields of medical history. There are, as we all know, two opposing theories. Either syphilis has existed in Europe since remote antiquity, or else it was first introduced from the West Indies, in particular the island of Hispaniola, by the crews of the ships that came back with Christopher Columbus from his first voyage of discovery in 1493. The battle has been so hotly waged that the essential points have been lost in the dust of the conflict, and the amount of evidence that has been brought forward in support of either side has been so great as rather to confuse than to clear the issue. Mathematical proof is rarely however, if ever, possible in history; we must be satisfied with that extent of demonstration that has been defined as the highest degree of probability, and certainly in an ancient controversy like the present such an amount of proof is all we can hope for. I will try, therefore, to balance the probabilities in this case, and see if they can be said to favour either of these two theories more than the other. Obviously the critical period lies somewhere at the end of the fifteenth century, and it is necessary therefore to look at the general history of that period briefly. It is marked by two great events. The first of these is the discovery of America by Columbus, the second the invasion of Italy by Charles VIII of France. As to the world-wide importance of the first there is no need to dilate; it is only necessary to point out that the discovery of a new world, the first intercourse between two previously sundered peoples, is the time of all others when a new disease may be expected to appear. We know that on several occasions the discovery of a new land has led to the introduction into that land of a new disease, and, moreover, that this disease, though comparatively harmless to the nation which previously suffered from it, has on occasion developed into a virulent epidemic in the virgin soil of a previously non-infected population. This introduction of a new disease by the discoverers of a new country is a commonplace, and in the particular instance of the discovery of America, small-pox¹ was undoubtedly introduced by the

European races to the indigenous inhabitants of the West. There is, therefore, nothing intrinsically improbable in the theory that the first explorers in a similar manner contracted a novel infection from the new peoples that they had discovered.

The second great event that marked the end of the fifteenth century, the invasion of Italy by Charles VIII, has had an effect on the history of the world second only to that of the discovery of America. If in the one case the East discovered the West, it is hardly too much to say that in the other the North re-discovered the South. To the army of Charles, composed of the mercenaries of all the nations of Europe, the Italy of the Renaissance was a revelation. To none more so than to the French, who had for so long been weighed down by the horrors of the English wars, which only terminated when Guienne and Gascony were lost to England in 1453. The French nation was now free to turn its attention to the new world that had arisen in the south, and the invasion of Charles VIII was the sword wherewith this new world was opened; a world as new to Northern Europe in all but a geographical sense, as America was new to Europe as a whole. The key-notes of the civilization of this new world were luxury and pleasure. Whatever the ennobling influences of the Renaissance in its later stages, influences that owed their power largely if not entirely to the wave of religious reformation that spread over Europe in the sixteenth century, it cannot be denied that at first, and more especially in Italy, it stood for a sensuous enjoyment, restrained by no sense of responsibility to man, nor by any feeling of reverence to God. It is to be noted, too, that the vice of the lighter southern nature, when engrafted on to the brutality of the more virile northern races, produced a compound of villainy of which there are only too many instances in the campaign of Charles VIII, a result recorded in the old Italian proverb, *Inglese italianato è diavolo incarnato*. And in no direction was this villainy more unrestrained than in the direction of sexual excess.

Given an army characterized by such morality what more perfect agency could be devised for the spread of a disease venereal in its origin, and contagious in its nature? And in fact this is not denied. Even those who favour most strongly the antiquity of syphilis accept the fact that a great recrudescence of that disease coincided with Charles VIII's expedition to Naples. Lastly, we have the universal consensus of opinion amongst the men best qualified to judge, that is the medical men in actual practice at the time, that a new disease did actually make its appearance at the end of the fifteenth century, a disease unknown to them

either in practice or by tradition. Further, that this disease was venereal in its origin, but differed from all other venereal diseases previously known to them, in that it was communicable by other means than sexual connexion, and also in that it was not merely local in its effects but influenced the entire constitution. As an instance of the opinion held on this point I may quote from Alexander Trajanus Petronius of Castile, who writes in 1565: 'Before this disease was known in Europe, an Ulcer, occasioned by Coition, and resembling those that the French Pox produces, would sometimes break out on the Pudenda. Buboës too and a Gonorrhoea would appear; but these symptoms were easily removed and left no Fomes behind them.'²

Throughout almost all the authorities given by Astruc in his monumental work, the absolute novelty of the disease is the great point insisted on. They may not all adhere rigidly to the date 1494; they may, as for instance Fulgosius, place the origin of the disease 'two years before Charles came to Italy', but as every one knows the most unreliable items in any mediaeval writings are the dates, especially when the question to be decided hangs on the difference of a few years one way or the other. Such comparatively slight differences are not, I take it, material.

Here, then, we have three great events, the first the discovery of a new world and a new race, the second the discovery, for so we may justly call it, of a new civilization, and lastly the sudden outbreak of a disease, which if not absolutely unknown previously to medical science, was so novel in its symptoms and manner of spread, as to delude those who came most closely into contact with it, and had the best chance of judging, into the belief that it really was a new disease. In the absence of any more direct evidence than the above it seems to me that we would be justified in saying that 'the highest degree of probability' favours the theory that syphilis was in 1493 a disease new to Europe, introduced from America, and assisted in its spread by the expedition of Charles VIII to Naples.

But evidence there is, and good evidence. Ruy Diaz de Isla, a man of, at that time, 31 years of age, was in practice in Barcelona in the year 1493. He was, as Bloch points out, a distinguished member of the medical profession, and an actual witness of the landing of Columbus at that port in 1493. His words are unmistakable.³ 'It seemed good to God to inflict on us a new disease, never before seen or known, and not to be found in any of the books of medicine, the Serpentine disease. This was first manifest and seen in Spain in the year of our Lord 1493 in the

town of Barcelona, the which town did first become infected, and, thereafter following, the whole of Europe and all the world, in all known and accessible parts thereof. This evil had in the beginning its root and origin in the island that now is termed Espanola, of the which we have plentiful assurance. And inasmuch as this island was found and discovered by the Admiral Don Christobal Colon, and since during his sojourn there his people had much intercourse and conversation with the folk of that island, and inasmuch as this disease is of its essence contagious, it passed rapidly into and manifested itself in the bodies of his company. And forasmuch as this disease was unknown to the Spaniards, neither had ever before been seen by them, they did attribute it to influences arising from the sea, and to other causes, each man as it seemed to him good. Moreover, it fell out at that time when the said admiral returned to Spain, that His Catholic Majesty was sojourning in the town of Barcelona, and as the tales and rumours of that voyage, and of those things that were seen and discovered in it spread, so also did that illness begin to infect, and spread through, the town; and inasmuch as the said illness was aforetime unknown, and very grievous, men did begin straightly to fast, and to offer up alms and oblations, so that God might give heed to them, that they should not be smitten with this disease. And thereafter in the year following, fourteen hundred and ninety-four, the Christian King Charles of France assembled much people and did pass into Italy, and at the time of his going there many Spaniards did join themselves to his army, of whom some were already smitten with this disease, and thus it chanced that the leaguer was thereby infected, and since the French knew not what it was, they imagined that the vapours of the earth did clog them, and called it the "Neapolitan Evil"; but the Italians and Neapolitans, who likewise knew it not, did name it the "French Evil", and thenceforward as the disease spread to new parts did each native give to it a name, according to the quarter in the which it seemed to them to have taken its origin.' As Bloch says,⁴ 'This is the report of Diaz de Isla, an eyewitness, an experienced and unprejudiced medical man.' He very rightly adds, if this testimony stood alone it might be discounted. But it does not stand alone. Other eyewitnesses there are, namely, Oviedo and Las Casas, and their testimony helps to confirm that of Diaz de Isla. This is not the place for a full discussion of all authorities on this point. Those who wish to go more fully into the question should consult Dr. Iwan Bloch's *Der Ursprung der Syphilis*, where the argu-

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ments in support of this view are set forth most clearly and in much detail.*

All that I am concerned here to show is that at the end of the fifteenth century a disease appeared which was considered by those who had to treat it absolutely different from any other with which they were acquainted in practice or by reading, that this coincided with the discovery of the New World, an occasion the most appropriate for the appearance of a new disease, and that it also coincided with one of the most momentous campaigns of European history, a campaign which introduced the mercenaries of the north to the new civilization of the south, a civilization which, whatever its glories, and they are many, created appetites without increasing restraints, and in no direction more than in the direction of sexual excess.

But whatever may be the history of syphilis generally, the history of that disease in a military sense undoubtedly begins with the invasion of Italy by Charles VIII. The campaigns of the early Middle Ages showed no outbreak of venereal disease that has attracted the notice of the historian. The campaign of Charles showed, and for the first time, syphilis in an epidemic form.

Towards the end of 1493, that king began to collect an army of 30,000 men for the invasion of Italy. The composition of this army is important.⁵ The great majority were drawn from Switzerland, Picardy, and Gascony, but 10,000 were drawn from the mercenaries of England, Spain, Italy, and elsewhere. The interesting point about these mercenaries is that they included Spanish soldiers of fortune. Diaz de Isla distinctly states, as already quoted, that these men were many of them already infected with syphilis, and that they introduced it into the expeditionary force. But men did not form the entire personnel of the army. As in Wallenstein's army, and in all continental armies till a considerably later date than that with which we are now concerned, a 'monstrous regiment of women' accompanied the soldiers of Charles, and it is certain that, as on another celebrated occasion at a much later date, the French leader *ne pouvait pas empêcher la galanterie nationale*. Not that Charles VIII seems either by precept or example to have made any attempts in that direction. His numerous halts during his progress through Italy seem to have been dictated, as to duration and locality, not by reasons of state, but by the facilities offered for dissipation. The departure of his army from Lyons was

* A more recent account by the same author is given in Vol. I of the present System.—Eds.

delayed about four months on account of *les bonnes grâces d'aucunes dames lyonnaises*; ⁶ at Asti delay occurred on account of illness charitably termed the small-pox, which may or not have been a euphemism; and so on. Eventually, having been hardly at all hindered by the enemy, Charles VIII entered Naples on January 28, 1495, four months and nineteen days from the date of his leaving Asti, ⁷ the only part of the town that still held out for the King of Naples being the Castle, and the Fort of Castelnuovo. The remainder of the town received the French troops literally with open arms, as regards a considerable portion of the female population at least. ⁸ 'As for the soldiers, they were overjoyed and cared only to celebrate worthily their victory. In constant revelry they boasted of passing from Bacchus to Venus. The king lived in pleasure, abandoning the care of affairs to courtiers who looked on the kingdom as a flock to be shorn and gorged themselves with booty. Surrounded by favourites Charles presided at feasts and employed his time *en faisant de bonnes et grandes chères*. He sent to Pisa for a woman whom he had seduced there and kept her always close to him. Every day the streets swam in blood shed in the constant brawls; the Swiss and Germans, almost always drunk, forced their way into the houses and outraged wives and daughters, striking down the husbands and brothers who opposed them.' In the meantime the Spaniards and other troops who still held out in Castelnuovo, finding themselves straitened for supplies, turned out of their lines all useless mouths, including all their women, who immediately sought the quarters of the French army. It is to the influx of these women that the chief infection of the French soldiers was attributed by contemporaries. Gideon Harvey insists on this point in a manner more consistent with the plain speaking of the sixteenth century than with the professional dignity of the twentieth. ⁹

We know from De Isla that infected Spaniards were already in Charles VIII's army, but with an army on the move it would not be so likely that the infection would pass to the women of the country and then back to the army, as in the case of an army at rest. But given the sudden influx of a large number of already infected women into the lines of Charles's troops, which actually did occur, it is readily comprehensible that, considering the life of wholesale debauchery which these men were leading, a general and severe infection should take place.

The French army rapidly made itself as hated by the Neapolitans as it had at first been welcomed, and, constrained by the arrival of reinforcements from Spain under the 'Great Captain'

Gonsalvo de Cordova, by the invasion of the Pyrenean districts of France, and the formation of hostile coalitions amongst the various lesser Italian states in his rear, Charles gradually retreated to France, narrowly escaping disaster at Fornovo, and leaving a large portion of his army, consisting chiefly of mercenaries, to find its way as best it might, each man to his own home. It will be seen from the above brief review of this memorable campaign that syphilis may have been taken by the French with them from France, having infected their army at the start through the Spaniards who originally joined it, or it may have spread to the French outside and in Naples during their occupation of that town, by means of the women turned by the Neapolitan troops, largely Spanish in their composition, out of their lines during the siege of Castelnuovo. This latter view seems to have been the popular one amongst contemporary observers, though, as already stated, the earlier introduction of the disease into the French army is supported by Diaz de Isla. The disease having once got a footing in the army, the account I have given of the sexual morality of the individuals composing that force will render it comparatively easy to understand how rapidly it spread amongst them and the unfortunate inhabitants of the districts they occupied. We hear of it all through Italy during the retreat of the French army.

Marcellus Cumanus¹⁰ met with it at the siege of Novara, he being then in the service of the Venetian Republic. 'In the year 1495 from a certain heavenly influx falling out in Italy whilst I was in camp at Navarre (sc. Novara) with the Venetian commanders, I observed many of the officers, as well as foot soldiers in the city of Milan . . . to have several scabs and pustules breaking out on the face and spreading all over the rest of their bodies. The first of which appeared usually under the foreskin, or on the outside like a grain of millet.' He proceeds to describe the constitutional symptoms in a manner that leaves no doubt as to the identity of the disease to which he is referring. Pintor and Torella testify to its appearance in Rome, Pietro Parenti in Florence, and other writers describe its appearance in other towns. It is important to note that throughout Northern Italy the chroniclers agree on three points. The first is that the disease was a new one, previously unknown to physicians, the second—that it came from the direction of Naples in company of the French army, and the third—that it was extremely malignant in its course. It would seem also, from expressions here and there, that it was far more readily communicable by

innocent contact than modern experience shows it to be. This, as well as the more rapid course, is only what one would expect in the case of a previously uninfected population. Virgin soil, *jungfräulicher Boden*, the expression used by Bloch, seems a ludicrously inappropriate term to apply to the men and women of Charles's army. But as to the disease being new in the experience of those who had to treat it there can be no doubt, as certainly there was no doubt of the fact in their minds. Having once got a foothold in Italy, syphilis retained its grip, and was again severe in the campaigns of Francis I in that country. Théodore de Héry of Paris¹¹ (1552) testifies to its presence in the Hospital of Incurables at St. Jacques. This gentleman at least had no doubt as to the first origin of the disease, for on seeing a statue to Charles VIII he prostrated himself before it in grateful recognition of his services to the cause of medicine, and the finances of its practitioners, in introducing so virulent a disease into the world. Outside Italy the spread of the disease was extraordinarily rapid. The composition of Charles's army, collected as it was out of all nations, from the Slavs in the east to the Spaniards in the west and the English in the north, more cosmopolitan even than the ordinary mediaeval army was wont to be, made it an admirable means of transmission of the new disease. The mercenaries scattering to their various homes carried the infection with them. The manners and customs of the time, especially in Northern Europe, the general personal uncleanness, the promiscuous way in which beds were shared, drinking cups, table utensils, and bed-linen used without cleansing, all these assisted in the spread of contagious disease. In Paris it was present at least in 1495, and severe in 1497, sufficiently so to be the subject of a special *Arrest du Parlement*, while a special commission,¹² consisting of two medical men, Philippe Roger and Gilles des Moulins, was ordered to report on the cases in the various hospitals in that town. The South of France was naturally the first affected, and in Provence the disease was definitely attributed to the return of the soldiers who had served in Italy. Here again the novelty of the disease is insisted on: *Infirmitas . . . quae adhuc non vigeat in Provincia*.¹³ In Germany the disease was also introduced by the returning mercenaries, some of whom had fought for Charles VIII, and some against him under Maximilian. The latter emperor refers to the disease among the other ills brought on humanity, *fames, terrae motus, et pestilentiae*, as a visitation of Divine wrath for blasphemy. It is described in the Edict *In Blasphemos*,¹⁴

dated at Worms on August 7, 1495, in the words *Praesertim novus ille et gravissimus hominum morbus nostris diebus exortus, quem vulgo malum Francicum vocant, post hominum memoriam inauditus saepe grassatur*. The novelty of the disease is here again insisted on. Bloch¹⁵ gives the various dates of appearance in the different Germanic towns ranging from 1496 to 1498. Throughout the same note is struck. The disease was unknown before, and it came from France and Italy. One cannot leave Germany without mentioning Ulrich von Hutten,¹⁶ who has earned a literary fame through his misfortune. He contracted the disease at the age of 21 or 22 when on service in Italy in 1509-10, and is a witness to its virulence in Germany; and it may not be out of place to quote at length his opinion as to the origin of the disease. 'It hath pleased God, that in our tyme sycknesses should arise which were to our forefathers (as it maye be wel conjectured) unknowē. In the yere of Christ 1493 or therabout, this pestiferous evyll creped amongst the people, not only in Fraunce, but fyrst appered at Naples, in the frenchemannes hoste (whereof it toke his name) whiche kept warre under the frenche Kyng Charles, before hit appered in any other place. By whiche occasion the frenche men puttynge from them this abhorred name, calle it not the frenche pockes, but the evyl of Naples, reekenyng it to theyr rebuke, if this pestilent disease shulde be named the frenche pockes. Notwithstandyng the cōsent of all nacions hath obteyned, and we also in this book will calle hit the frenche pockes, not for any envye that we beare to so noble and gentyll a nacion, but because we fere that all mē should not understand, if we gave it any other name.' Von Hutten from his having served in Italy so soon after the first appearance of the disease, and being obviously a well-educated man, is a very valuable witness as to the novelty of the disease. He is also the authority for the statement that the disease 'not long after his begynnyng entred into Germania, where it hath wandered more largely than in any other place: whiche thyng I do ascribe unto our intemperance'.

In the case of the Low Countries it is supposed to have been introduced by the retinue of Jane, daughter of Ferdinand and Isabella, on the occasion of her marriage with the Archduke Philip, and was hence called the Spanish Disease.¹⁷

As regards England the evidence of the introduction of the disease is not very clear. The earliest mention that we have of it is an entry in the Privy Purse Expenses of Elizabeth of York, Henry the VII's queen, of the payment to a 'surgeon which heled

him (i. e. one of her servants) of the Frenche pox Sma. 40 s'.¹⁸ On the other hand, Andrew Bord, who was born 1480, writes in his 'Breviarie of Health' published in London 1598:¹⁹ 'In English Morbus Gallicus is named the French pocks, when that I was young they were named the Spanish pocks.' Bloch,²⁰ however, quotes from Fuchs to show that in Bristol in 1498 the disease was already known under the name of *Morbus Burdigalensis* or Bordeaux Evil. Perhaps this multiplicity of names points to a multiplicity of sources of origin. The 'Spanish pocks' of Bord may well point to a direct introduction by coasting vessels from Barcelona and elsewhere, while probably the term Bordeaux Evil indicates a similar introduction by the wine trade from Bordeaux. The later introduction of the disease by soldiers returning from service in Italy with one or other of the Free Companies, through the ever open door of Calais, would naturally give rise to the more common but later appellation. The first of our great surgeons to mention the disease is Clowes,²¹ who, in his book, 'A Briefe and Necessary Treatise touching the Cure of the Disease called Morbus Gallicus,' published in 1585, speaks of its great prevalence in London as follows: 'First I saye the disease itselfe was never more ryfe among the Indians, Neapolitans yea in Italie, Fraunce, or Spain then is at this daye in the Realme of England.' In Scotland we find mention of syphilis earlier than in England, perhaps on account of the more frequent and direct communication between Scotland and France at that period.* Official notice is taken of the disease under the name 'Grandgor' in a proclamation by James IV dated September 22, 1497,²² wherein it is ordered that 'all manner of personis being within the freedom of this burt, quilks are infectit, or has been infectet, with this said contagious plague callit the Grandgor' should repair to Leith, where they would find boats to convey them to the Island of Inchkeith, under penalty of branding, and if persisting in the offence, of banishment. James IV took a great interest in the disease, and there are records of payments by him to persons infected by the 'Grantgore' at Dalry in Ayrshire in September 1497, Linlithgow in October of the same year, Stirling in March, Glasgow in February, and again at Linlithgow in April 1498. In the case of Stirling and Glasgow the payment is recorded as being made at the 'town

* Through the courtesy of the late Professor D. J. Cunningham, I am able to give photographs at the end of this article of bones supposed to be the oldest specimens of syphilis extant in this country; their age and the morbid process which they illustrate are equally doubtful.

end', which seems to point to some measure of segregation. An Aberdeen ordinance of October 8, 1507, uses the name 'seiknes of Napillis', and Dunbar, writing soon after 1500, uses the term 'Spanyie pockis'.²³

It is hard to find any reference to the quantitative prevalence of syphilis, or the venereal lues, as it came to be called in England, during the sixteenth, seventeenth, and eighteenth centuries. Descriptions of treatment, arguments for and against the use of mercury, guaiacum, and opium, there are in plenty. That the disease was prevalent, and widely so, is undoubted. But because it was so widely spread it seems to have been accepted as a matter of course, and hardly worth the notice of the physician, apart from its treatment. It appears as if we might almost reverse the dictum of Virchow, and say, as regards the soldiery of those days, where there was man, there then was syphilis. Whatever may have been the cause, the fact remains that the most prominent military surgeons of those times never refer to the extent of syphilis. Its presence seems to have been taken for granted. Thus Parè, Woodall, Wiseman, Colbatch (*Novum Lumen Chirurgicum*, 1694), and Belletost make no remarks on this point. This is the more remarkable in that the latter, who wrote an excellent little *Chirurgie d'Hôpital* in 1700, was a *Chirurgien-Major* in the army of Louis XIV in Italy, a country whose associations for the French army might have been expected to have afforded material for comment on this point. Mindererus²⁴ gives the following good advice in his *Medicina Militaris*: 'Avoid also the company of base women, lest thou shouldst be constrained to undergo the Mercurial Salivation, and with it a very lean diet, of thin broth, water-gruel, barley-broth, prunes, roasted apples, and such-like, without any flesh meat at all'; but he does not tell us if his advice was followed or neglected, or of the general prevalence of such diseases in the Teutonic armies of the seventeenth century. This reticence continued up till a much later period. Sir James McGrigor, in his 'Medical History of the Peninsular War', does not refer to venereal diseases when mentioning and discussing the chief diseases of the campaign, though we know from other sources that they exercised a considerable effect on the British army. The allusions made by Larrey are of the slightest; so, too, those of Sir Charles Bell in his lectures.

Astruc²⁵ points out how the constant wars between Louis XII and Ferdinand, under whose rule were the Germans, Dutch, Italians, and Spaniards, and later the wars of Francis I with Charles V, must have considerably accelerated the propagation of

the disease. Of the localised epidemics of the disease mentioned by Hirsch the majority owed their introduction into new and uninfected spots to military operations.

The earliest of these is the disease called in Scotland Sibbens, which appeared first of all in the south-western districts of Scotland about the time of the English invasion under Cromwell, and received a wider distribution by the dispersion of troops over the highlands in the last years of the seventeenth century. Blair,²⁶ in his 'Miscellaneous Observations in the Practise of Physick', published in 1718, says: 'It now remains that I enquire into the origine and inform you of the ordinary cure of this distemper. As to the first, after a more serious consideration of the matter, I can find nothing more reasonable than that after the Battle of Killychrankie when the Souldiers being dispersed over our Highlands, had a greater occasion of diffusing their impurities in those parts of the Country, and of infecting the Females there.' The disease was subsequently more widely spread, owing to the preference exhibited in the Lowlands for Highland nurses, some of whom had been infected in the above manner. Sibbens was, according to Hirsch, syphilis complicated by innocent forms of skin disease, occurring in the underfed and half-civilized inhabitants of certain districts. On this hypothesis, with increased prosperity the gradual merging of the disease into the common type of syphilis can be easily explained. Further examples of local outbreaks may be found in Hirsch. From these we can readily gather that since its earliest introduction syphilis has owed its spread to military operations.

An early notice of the prevalence of venereal diseases in a campaign is given by Willaume²⁷ as follows: 'André de Leon, physician and chief surgeon in the army of the Duke of Alba in the war waged by the Spaniards against the Portuguese in 1579 and 1580, reports in a treatise on *la vérole*, which he published in 1605, that he saw in the town and port of Setubal venereal infections assume such a malignant form that he and his assistants amputated upwards of 5,000 penises. So great were the ravages of this disease that the duke, naturally alarmed, ordered De Leon to visit, weekly, all the prostitutes, and to order 200 lashes to all who were not provided with a health certificate, a step which was followed by excellent results. If the number of these amputations is not exaggerated, it is allowable to suspect that the blame which was laid at the door of these unfortunates might more justifiably have been attributed to a vicious method of treatment or to the influence of climate. It is necessary to

remember that at the date named venereal diseases showed a considerably higher degree of virulence than in our day. We read in the Commentaries of the Marquis de Saint-Philippe, that when the Anglo-Portuguese army was encamped in the neighbourhood of Madrid, in the year 1706, the prostitutes of that town, not desiring to be outdone in patriotism by other inhabitants, infected the army to such an extent that there were soon after 6,000 cases of venereal disease in the hospital, of whom the greater part died.'

The particular interest of this quotation lies in the fact that more than 200 years after André de Leon wrote, and just 100 years later than the observation of Saint-Philippe, the British army was engaged in war in the Peninsula and again suffered severely from a mutilating type of venereal disease. The following quotations from a paper read before the Medico-Chirurgical Society on June 9, 1812, and written by Inspector-General Ferguson of the Portuguese army, illustrate this : ²⁸

'In the British army it is probable that more men have sustained the most melancholy of all mutilations, during the four years that it has been in Portugal, through this disease, than the registers of all the hospitals in England could produce for the last century ; while venereal ulceration has not only been more intractable to the operation of mercury than under similar circumstances at home, but the constitution, while strongly under the influence of the remedy, has become affected with the secondary symptoms in a proportion that could not have been expected. With the natives, on the contrary, the disease is very mild ; curable, for the most part, by topical treatment alone, or wearing itself out, when received into the constitution, after a certain course (not always a very destructive one) without the use of any adequate mercurial remedy.'

Later, he remarks on the carelessness of the Portuguese soldier in the case of sores. 'I have seen him turn out for duty with ulcers that made me shudder to look at, though both he and his medical attendant considered them as nothing ; but they are large extensive ulcerations (for which two of them have suffered amputation of the prepuce) that must have incommoded him in walking, and caused great inconvenience previous to his being taken into hospital.'

This localised virulence of disease is extremely interesting, especially as recurring in the three campaigns noted. Ferguson attributed it to the fact that the Portuguese never used mercury, so that while they themselves acquired an inherited immunity to

the disease, the original poison remained unaffected and still retained its virulence towards foreigners. He adduces parallel instances, not very convincing, it must be confessed, from Germany and Russia.

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CHAPTER III

SYPHILIS IN THE BRITISH ARMY

REFERENCES to syphilis in the British army are scattered through the writings of military surgeons of the eighteenth century, but very little accurate information is afforded. By some the subject is ignored. Pringle,¹ for instance, passes it over in silence.

The material at our disposal is, in fact, so unsystematic that a complete account is impossible, and I shall therefore refer only to a few of the authorities available. Monro,² writing in the year 1780, refers merely to the fact that the type of disease had become milder since the first years of its prevalence in Europe. He distinguishes between the various forms of lues venerea to the extent of calling syphilis 'the confirmed lues venerea or pox', and gives a good account of inunction as practised at that time in Montpelier. He is himself a firm upholder of salivation. John Hunter³ refers to the comparative infrequency of syphilis in Jamaica, only 2 out of 331 admissions to hospital from the 92nd Regiment being due to venereal disease. He points out the bearing of this fact on the theory of the American origin of the disease.

Lemprière⁴ is one of the first to give actual figures, which though of little statistical value are not without interest. In the last quarter of 1792 the garrison of Jamaica, consisting of the 20th Light Dragoons, and the 1st, 10th, 13th, 16th, 20th, 49th, and 62nd Regiments of Foot, showed 8 admissions for venereal disease out of a total of 1,270 for all causes. In the first quarter of 1793 the same regiments returned 17 cases of venereal disease out of a total of 1,227. In the second quarter of 1793 the proportion was 12 out of 1052, in the third quarter 7 out of 979, and in the fourth 7 out of 902. In 1794 the garrison, which was reduced owing to the departure of the 13th, 20th, and 49th Foot, showed 3 venereal admissions out of 516 in the first quarter, and 4 out of 413 in the second. Later figures are given only for the 20th Light Dragoons in 1796 and 1797. In the former year this regiment had 7 men admitted for venereal disease, and in the latter 3, the total admissions for all diseases being 545 and 496 respectively. Taking the entire body of figures thus fur-

nished, we find that out of a total of 7400 admissions to hospital only 68, or about 1 in 110, could be attributed to a venereal origin. It is interesting to compare these figures with those for more recent years. In the decades 1896-1905 and 1897-1906 the ratio of admissions for venereal diseases to admissions for all causes was as 1 to 4·3 and 1 to 4·7 respectively. This is not, of course, any proof of an absolute increase in venereal disease, since the alteration must be largely attributed to a reduction of the incidence of infectious diseases due to improved sanitation. It accounts in part, however, for the fact that comparatively little notice was paid to venereal diseases by the military surgeons of those days, seeing how much more importantly zymotic diseases bulked in their daily work.

It is not improbable, however, that there was really a relative decrease in the venereal admissions in the West Indies as compared with other stations, since the same fact is noted in a 'Statistical Report'⁵ published officially in 1838. Referring to a table giving the admissions for 'Venereal Diseases per 1,000 of strength at Home, and in the Windward and Leeward Command', it says, p. 10: 'The most remarkable feature in this table is the rarity of admissions under the head of Venereal Diseases in this Command, which, as will be seen by the General Abstract, applies to syphilis and ulcers on the genitals of doubtful origin, as well as gonorrhoea, thus indicating a connexion between these three species of venereal affections; and it is particularly striking that though ulcers on all other parts of the body are nearly thrice as numerous as in Britain, those on the genitals are eight times less so. That the rarity of this class of diseases does not arise from the increased temperature merely, is sufficiently evidenced by the fact that in the East Indies and Mauritius the ratio of venereal diseases is greater even than at home. That it does not arise from any peculiarity in the constitution of the negro females, with whom the soldiers are generally in connexion, is also proved by the troops being so liable to it in Mauritius, where the lower class of the female population are of this race; and it cannot be owing to any precautionary measures for the preventing of the propagation of the disease, because there are no police regulations on this subject in this Command. The same will hereafter be shown to exist throughout the whole of the West India settlements; and as those who know the habits of the soldier there would never think of referring this exemption to any superiority in moral conduct, it must be attributable, in a great measure, to the climate being unfavourable to the existence and

propagation of that disease. The same peculiarity has been remarked in some of the old medical returns, nearly fifty years ago.' Reference to the geographical distribution of syphilis in the British army will be made later, when discussing the period of accurate statistics. The above are put forward as an interesting coincidence of observations.

Of the older observers it would be wrong to omit Thomas Dickson Reide,⁶ who wrote in 1793. Speaking of venereal diseases he says: 'The venereal disease always prevailed more or less, particularly when we were quartered in Montreal. Sometimes the infection was of a very virulent nature, which our men got from the Indian or Canadian women. A species of lues is supposed to be peculiar to Canada, of which I shall give a short description. It is highly contagious and supposed capable of being communicated by drinking out of the same vessel or by the breath. It generally commences with a sore throat and hoarseness: the palate is highly inflamed, and is attended with great thirst and some degree of fever; the uvula soon becomes ulcerated; on the edges of the tongue are white and callous ulcers; the forehead, and about the roots of the hair are covered with a flat scaly eruption; the same appears in the perinaeum and adjacent parts, where it suppurates and often ulcerates. The disease spreads with rapidity; the patient is racked with sharp and constant pains in the articulations of the joints; a universal sickness seizes him, with extreme debility and lassitude. This is followed by a painful swelling of the periosteum and rising exostoses; the bones and cartilages of the nose and palate become spongy and carious; after which the unfortunate sufferer dies in much agony.' The author draws a parallel between this disease and 'Sibbens or Sewins', and it is indeed not impossible that the Canadian disease was attributable to a strain of infection whose virulence had been exalted by passage through unhealthy or badly-fed aborigines. The following actual figures are of interest. The 29th Regiment, in the months of November and December 1777, had two admissions for venereal disease; in the year 1778, forty-seven. In 1779, 1780, 1781, and 1782, being engaged on active service in the American War of Independence, there only occurred dropping cases. A further interesting note refers to the incidence of venereal diseases amongst the 3/60th in the West Indies between December 1788 and November 1791. In these three years there were only thirty-five admissions for this cause, a figure that agrees closely with those already adduced by Hunter and Lemprière.

Passing now to the great struggle in the Peninsula, we have here at our disposal the 'General Abstract of the Admissions and Deaths in the Regimental Hospitals in the Peninsula; from the 21st December 1811 to the 20th June 1814',⁷ compiled by Sir James McGrigor, the principal medical officer to the army in Spain. From this it appears that there were between the two dates mentioned 4,912 admissions for syphilis in the entire army, out of a total of admissions for all causes of 176,067, or roughly 1 in 36. The death-rate was, taking both general and regimental hospitals together, about 0·8 per cent. of the cases treated, and very considerably higher in the first year (21·12, 1811, to 20·12, 1812) than in the remainder of the period. Thus in the first year the death-rate was 1·2 per cent. of cases treated, in the second year under ·6, and in the last six months under ·8. This may be in part attributed to the well-known extreme severity of the phagedaenic complications in Portugal already referred to, but partly no doubt to the fact that the troops became more seasoned and disciplined as the campaign proceeded, by the time when, as the Provost Marshal of the force said, the army had been flogged and hung into a state of discipline. Sir James McGrigor himself attributes the improved health in this respect 'to the healthful bracing air of the mountainous encampments, at a distance from the villages. Much must likewise be attributed to the moderate and wholesome portion of labour, which the troops had in fortifying the passes; to the abundance and good quality of the provisions; very much to the soldiers being excluded from the temptations to drunkenness and disorder, which too irresistibly offer themselves to them when quartered in towns and villages.' Good food, sufficient work, and absence of opportunity are, it must be confessed, still, as in those days, the best guarantees for good behaviour generally, and thereby for a diminished incidence of venereal disease.

The first attempt at systematic statistics in the British army is presented by the 'Statistical Report on the Sickness, Mortality, and Invaliding among the Troops in the West Indies', published in 1838, the 'Statistical Reports on the Sickness, Mortality, and Invaliding among the Troops in the United Kingdom, the Mediterranean, and British America', published in 1839, with similar Reports referring to 'Western Africa, St. Helena, the Cape of Good Hope, and Mauritius', 1840, and 'Ceylon, Tenasserim, and the Burmese Empire', 1841. The troops in Australia and India are not included, and the figures are therefore so far incomplete; but, such as they are, I have included them in Table I.

TABLE I

TABLE SHOWING STRENGTHS, TOTAL ADMISSIONS, AND ADMISSIONS PER 1,000 OF STRENGTH FOR SYPHILIS PRIMITIVA ET CONSECUTIVA, FOR CERTAIN PORTIONS OF THE BRITISH ARMY FROM 1817-1846

<i>Year.</i>	<i>Strength.</i>	<i>Total Admissions.</i>	<i>Admissions per 1,000 of strength.</i>
1817	24,440 ^a	1,068	43·7
1818	28,996 ^b	945	32·6
1819	27,288 ^c	599	22·0
1820	25,500	424	16·6
1821	26,974	315	11·7
1822	25,910	286	11·0
1823	24,702	231	9·4
1824	27,059 ^d	275	10·2
1825	28,983	344	11·9
1826	27,786	326	11·7
1827	28,368 ^e	393	13·9
1828	29,121	313	10·7
1829	30,550	648	21·2
1830	37,541 ^f	794	21·2
1831	34,963	660	18·9
1832	34,008	801	23·6
1833	34,472	796	23·1
1834	34,870	598	17·1
1835	33,187	492	14·8
1836	35,087	647	18·4
1837	36,450 ^g	1,079	29·6
1838	42,479	1,121	26·4
1839	47,266	1,633	34·6
1840	44,479	1,377	31·0
1841	48,956	1,444	29·5
1842	47,599	1,595	33·5
1843	51,489	2,738	53·2
1844	55,899	2,693	48·2
1845	52,153	2,942	56·4
1846	48,060	2,882	60·0

This table gives the admissions for Syphilis Primitiva and Syphilis Consecutiva, for those sections of the army referred to above, from 1817 to 1836, and it is continued for a portion of them to 1846 from figures available in a volume entitled 'Statistical Reports on the Sickness, Mortality, and Invaliding among the Troops in the United Kingdom, the Mediterranean, and British America',^g published officially in 1853 as a report to Parliament.

^a Windward and Leeward Command, Jamaica, Honduras, Malta, Ionian Islands, Bermuda, Nova Scotia, Canada, Ceylon.

^b Gibraltar, St. Helena, Cape of Good Hope, Mauritius, in addition to above.

^c West Africa in addition.

^d Burmese Empire in addition.

^e Burmese Empire omitted. Tenasserim added.

^f Dragoons and Dragoon Guards, home stations, added.

^g United Kingdom, Mediterranean, and British America only from 1837-46.

Though the figures lose a great deal of their value from the fact that they refer to only a portion of the army, and that not always the same portion, still they may be taken as having a certain weight. The sequence shows that there was a marked decrease in admissions for the two diseases referred to between 1817 and 1823, after which period they rose steadily. This was not limited to syphilis alone. The incidence of simple primary sore shows a precisely similar fall and rise. What the causes of these variations were it is impossible now to ascertain. It is permissible, however, to conjecture that the steady rise in the later '20's and subsequent years was due, in part at least, to the decay of true discipline in the long years of peace, and the general neglect with which the army was treated in those years, not only by Government, but by the nation at large. There can be no doubt that one of the most important factors in making and keeping an army healthy, is a lively interest in its welfare on the part of the general civil community. The old proverb that 'It is the master's eye that makes the horse grow fat' is true of other things than stable management. In especial is this true in the case of venereal diseases, which depend so much, as regards their prevalence, on the social position of the soldier, and the treatment that he receives in this sense from his countrymen and countrywomen outside barracks. As long as the soldier was looked on as more or less an outcast, it was hardly to be expected that he would retain that self-respect which goes so far to keep a man from promiscuous immorality, and from its consequences. It has been well said, I forget by whom, that for many years it was looked on by large numbers of the respectable poorer class almost as disgraceful to have to confess that 'My son John has 'listed for a soldier' as to confess that 'My daughter Mary has had a misfortune'. That this view had a great effect in keeping up the high ratio of admissions for venereal disease in our army is my firm opinion, and it is at least worth noting that those nations which honour their soldiers most can show the lowest rate of admissions for venereal disease, the best situated of all being Germany, where the soldier stands higher in the estimation of his countrymen than is the case in any other nation. In England, where within a very few years a man wearing the king's uniform was hardly allowed inside a public-house, and was at least liable to be refused refreshment in it, and in the United States, where the army is not looked on as a vital integer of the national life, the ratios are the highest of any in the world.

This is a point which will be referred to later. As regards the

letterpress of these reports there is little to notice. The greater or less incidence of syphilis in different stations is attributed as a rule to 'climate'—that blessed word, so useful a solvent of sanitary difficulties in the old days.

Between 1846 and 1859 no complete statistics are available, and the only figures I have been able to find are those furnished to a Joint Committee of the Admiralty and the War Office, which sat in 1862 to inquire into the prevalence of venereal disease in the navy and army. These refer only to the garrison in Malta, for the years 1852 to 1860, and include all venereal disease. Their limited nature makes them hardly worth reproduction, but they show admission rates as high as 100, 150, and even 200 per 1,000, indicating that the prevalence of this class of disease maintained a high level during this decade.

During the Crimean War the incidence of venereal disease was extremely slight. Full statistics are available in the 'Medical and Surgical History of the Crimean War',⁹ published in 1858. During the first three months included in the above report (April, May, and June, 1854), whilst the expeditionary force was collecting in the neighbourhood of Varna, Scutari, and Gallipoli, the admission-rate for syphilis (*primitiva* and *consecutiva*) averaged 7 per 1,000, a very low rate. In July, when the army moved out to Aladjan, it fell to a little over 2 per 1,000, a figure which was never again attained during the progress of the war. Syphilis may, indeed, be considered as having been quite negligible as a cause of inefficiency in this campaign, and is in fact ignored in the letterpress of the 'History'. This is easily intelligible when the peculiar conditions of the siege, which constituted the greater part of the campaign, are considered. Hard work, scanty rations, and absence of opportunity, left but little opening for irregular sexual intercourse. Fortunately the conditions under which the British soldier wages war are invariably such as afford scanty opportunity for contracting venereal disease, and in no campaign of the last hundred years have these diseases shown any but the most trivial incidence.

Except for the statistics of the Crimean War there is, as a matter of fact, practically a complete gap in the figures available for a history of disease in the British army between 1846 and 1859, when the first report of the Director-General was furnished,¹⁰ a report which has been issued annually since that date. It is possible, therefore, with some limitations, to construct a complete history of syphilis in the army from 1859. The limitations to which I refer are imposed by vagaries of nomenclature. Up

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to the year 1869 all venereal diseases are included under the heading Enthetic Diseases. In 1869 Syphilitic Diseases as a whole are returned, and in 1879 for the first time primary and secondary syphilis are shown separately. In the curve on Fig. 1 the variations in the admission-rate are given for enthetic disease from 1860 to 1868, and for all syphilitic disease from 1869 to the present date. I have been unable to give the figures for 1874, since in the report for that year Constitutional Diseases (including under this heading rheumatism and allied diseases as well as syphilis) only are available.

TABLE II

TABLE SHOWING STRENGTH, ACTUAL ADMISSIONS, AND ADMISSIONS PER 1,000 OF STRENGTH FOR ENTHETIC DISEASES IN THE BRITISH ARMY AT HOME AND ABROAD, 1860-1868.^a

<i>Year.</i>	<i>Strength.</i>	<i>Admissions.</i>	<i>Admissions per 1,000 of Strength.</i>
1860	198,732	62,893	316.05
1861	191,299	57,548	300.83
1862	194,729	52,007	267.07
1863	192,504	47,917	249.44
1864	186,359	44,283	237.62
1865	179,594	39,937	222.31
1866	170,002	36,776	214.53
1867	169,374	39,419	232.74
1868	168,149	39,836	237.09

The main fact to be gathered from this curve is the very striking reduction that began apparently in 1860 and continued until about 1877, to be followed by an equally marked rise to a maximum in 1886. Following on this we have a second drop in the number of admissions, with two secondary exacerbations in 1890 and 1894. 1895 and 1896 show admission-rates but little lower than 1894; but since the last named of those two years the decrease has been continuous and phenomenal. The only interruption occurred in the year 1903, when the conclusion of the long war in South Africa was followed by the usual increase in venereal disease that marks such an event. It is to be noted that the rise in the late '70's and the '80's is not confined to this class of disease alone. It is shown also in the case of tubercular disease, and in the admission-rate for all diseases during the same period. This fact was alluded to in a paper read by Sir Alfred Keogh, the Director-

^a Figures showing admissions for syphilis only, not available for this period. In the curve on Fig. 1 half the admissions shown in this table have been taken as representing approximately the admissions for syphilis.

TABLE III

TABLE SHOWING STRENGTHS, ACTUAL ADMISSIONS, AND ADMISSIONS PER 1,000 OF STRENGTH FOR SYPHILIS FOR THE BRITISH ARMY AT HOME AND ABROAD, 1869-1908.

<i>Year.</i>	<i>Strength.</i>	<i>Admissions.</i>	<i>Admissions per 1,000 of Strength.</i>
1869	161,793	15,593	96.43
1870	160,723	12,663	79.14
1871	169,532	13,669	80.88
1872	170,202	14,151	83.24
1873	167,862	11,922	71.38
1874	166,911	— ^a	— ^a
1875	169,235	13,013	77.00
1876	169,197	12,271	72.61
1877	174,884	12,878	73.94
1878	185,000	16,575	89.59
1879	164,642	14,878	90.72
1880	159,622	18,869	117.92
1881	173,331	19,830	116.65
1882	174,557	19,699	115.86
1883	168,383	22,055	129.74
1884	167,686	23,505	139.88
1885	177,928	27,261	164.39
1886	188,739	23,928	179.37
1887	194,037	19,583	100.94
1888	198,851	19,365	97.81
1889	198,448	24,090	121.17
1890	196,502	26,282	134.09
1891	196,270	22,693	115.78
1892	199,049	22,765	110.94
1893	202,125	23,747	117.56
1894	203,469	27,436	145.01
1895	200,681	28,081	140.41
1896	203,145	28,171	138.87
1897	198,294	24,235	122.39
1898	202,166	19,249	95.29
1899	201,004	15,440	76.82
1900	226,276	11,674	51.66
1901	196,796	10,271	52.14
1902	254,357	10,315	40.61
1903	282,182	12,668	52.31
1904	244,425	9,219	37.72
1905	240,075	7,039	29.32
1906	230,128	5,958	25.89
1907	217,844	5,033	23.11
1908	215,467	4,137	19.19

^a Not shown in A.M.D. report.



FIG. 1. Curve showing admissions per 1,000 of strength in the British army, at home and abroad: for enthetic diseases, 1860-1868; for syphilis (primary and secondary), 1869-1908.

(NOTE. The dotted line 1860-1868 gives an approximate idea of the admissions for syphilis, primary and secondary, during that period, taking these as being equivalent to one-half of the total admissions for enthetic diseases.)

General of the Army Medical Service, before the Royal Sanitary Institute in November 1908,¹¹ and was illustrated by curves exhibited on that occasion. The causes of this increase are to be found in part at least in administrative changes in the army generally, and in the constitution of the Army Medical Department. These years were marked by the gradual elimination of the old, and the introduction of the young soldier, and also by the change from the old regimental to the more practical modern Departmental Medical Service. One effect of that change, at first, was to loosen the touch between the soldier and his 'doctor'. Quite apart from the moral effect of such a disassociation, it is probable that a considerable amount of unofficial out-patient treatment, then in existence inside the different regiments, was put an end to when the sick man came under the care of a medical officer unacquainted with his case and the customs of his unit. It must be remembered, too, that these years, 1877 to 1886, were years of almost constant war. Between the date of the advance into Afghanistan in the former year and the termination of the Nile Campaign of 1885, the army was engaged continually in war either in Asia or Africa. The army at home was therefore constantly receiving an influx of men just returned from field service, and prone, as it must be confessed is only natural, to indemnify themselves for years or months of hardship in the jungle or the desert by an outbreak of self-indulgence at home. The high ratios of 1894 and the succeeding years are largely Indian in their provenance. Whatever the case may be as regards these earlier years, there can be no doubt as to the fall that has shown itself in the last thirteen years. Of the causes of this I shall speak more in detail later. Administrative measures have had their share, no doubt, and improved methods of treatment must not be forgotten, but the largest share, in my opinion, is undoubtedly attributable to a change in the mode of life of the British soldier.

The extended curve given in Fig. 1 suffers from the defect common to all such methods of demonstration, and indeed to all statistics, when spread over too great a length of time, and applied to bodies of men serving under different conditions of climate and social surroundings. I have therefore added tables and curves showing the admission-rates, numbers constantly sick, and invaliding, due to syphilis, for the army in the United Kingdom and the army in India, since the year 1880. The period is not too extended, and the two great divisions of the army which I have selected have remained during the period mentioned comparatively

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uniform in strength, and under sanitary and social conditions which, if not unchanged, have at least not been subject to great or sudden variations.

TABLE IV

TABLE SHOWING ADMISSIONS, NUMBERS CONSTANTLY SICK AND INVALIDED, PER 1,000 OF STRENGTH ON ACCOUNT OF SYPHILIS IN THE ARMY AT HOME.

<i>Year.</i>	<i>Admitted.</i>	<i>Constantly sick.</i>	<i>Invalided.</i>
1880	126·3	9·53	·71
1881	132·1	10·17	·44
1882	129·8	9·93	·61
1883	145·0	11·61	·63
1884	155·3	13·15	·46
1885	154·2	12·31	·53
1886	122·4	10·34	·48
1887	116·4	10·31	·64
1888	106·5	10·13	·93
1889	97·5	9·09	1·05
1890	106·4	9·95	·81
1891	98·3	8·82	·72
1892	100·5	9·46	·70
1893	88·7	9·10	·76
1894	82·5	8·79	·83
1895	77·9	8·09	1·05
1896	75·8	7·79	1·30
1897	33·5	6·66	—
1898	57·2	6·26	1·29
1899	51·3	5·18	1·06
1900	33·3	3·09	·83
1901	38·1	4·15	·90
1902	46·0	4·67	1·27
1903	46·3	5·39	·88
1904	34·8	4·0	·92
1905	27·4	3·14	·66
1906	26·7	2·78	·42
1907	23·7	2·59	·25
1908	20·1	2·17	·30

In the case of the curves relating to the army at home, it will be noted that there has been a steady fall since 1884, practically uninterrupted till 1901, when the return of soldiers from South Africa undoubtedly was the cause of the comparatively slight increase in that year and the two immediately following. As will be seen, the admission-rate for 1908 was only a little over 20 per 1,000, less than one-seventh of what it attained to in its maximum year.

The curves and figures depicting the course of events in India are markedly different from those above referred to.

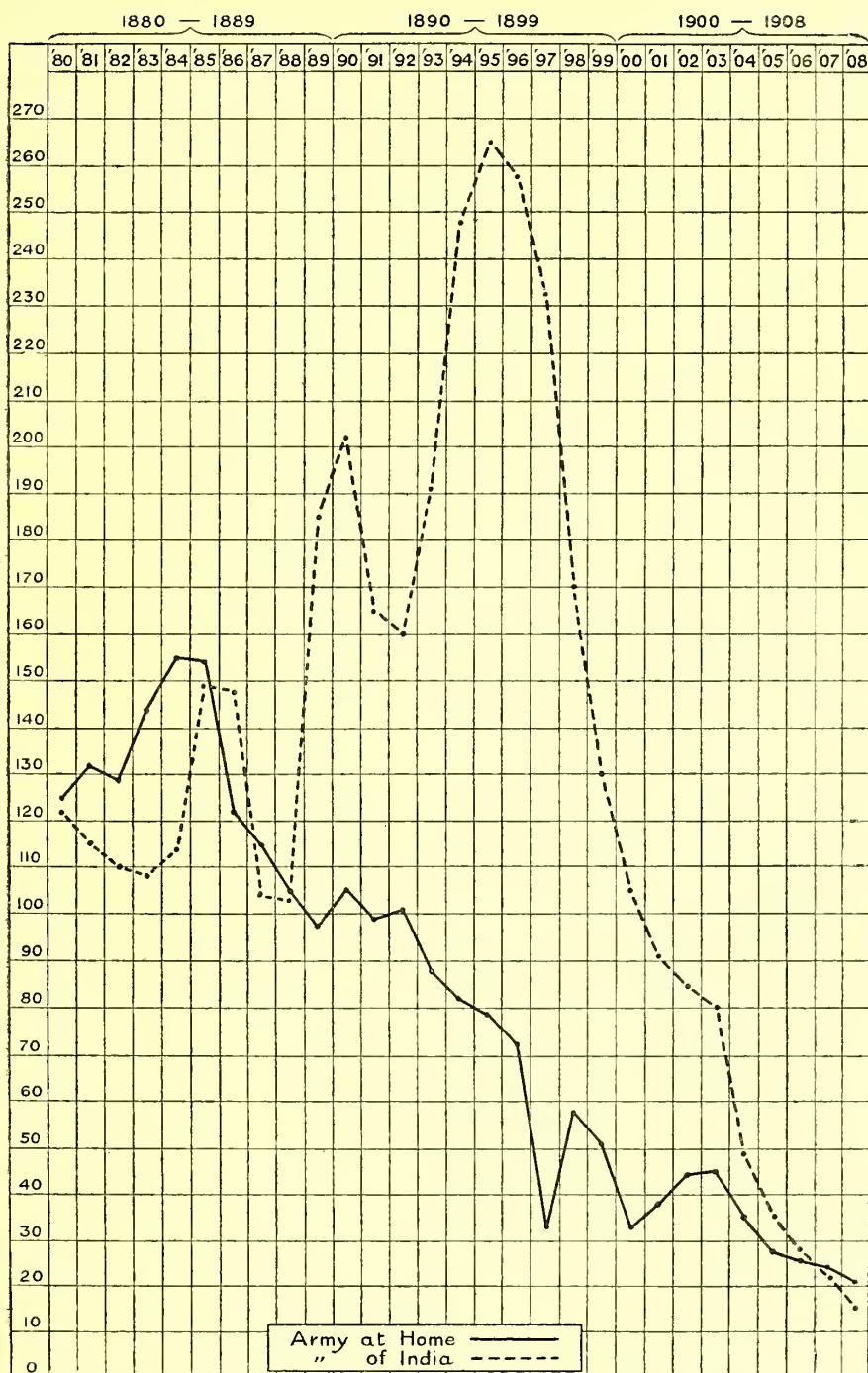


FIG. 2. Curves showing admissions, per 1,000 of strength, for syphilis (primary and secondary), in the army at home and in the army of India, for the years 1880-1908.

TABLE V

TABLE SHOWING ADMISSIONS, NUMBERS CONSTANTLY SICK, INVALIDED HOME, AND DISCHARGED FROM THE SERVICE, PER 1,000 OF STRENGTH, ON ACCOUNT OF SYPHILIS, IN THE ARMY OF INDIA FROM 1880-1908.

<i>Year.</i>	<i>Admitted.</i>	<i>Constantly Sick.</i>	<i>Invalided Home.</i>	<i>Invalided for Discharge.</i>
1880	122.1	Figures incomplete	0.85	0.81
1881	115.4		0.98	0.49
1882	110.5	8.81	1.20	0.41
1883	108.2	8.84	1.37	0.46
1884	113.6	8.45	1.15	0.18
1885	149.7	10.77	0.94	0.35
1886	147.8	11.40	1.05	0.16
1887	104.8	8.76	1.48	0.34
1888	104.8	8.38	1.46	0.95
1889	185.1	15.88	1.76	0.94
1890	202.8	18.12	2.95	1.05
1891	165.6	15.34	3.76	1.84
1892	160.6	14.49	2.92	1.08
1893	191.4	17.64	3.79	0.34
1894	247.8	22.51	3.86	1.4
1895	265.4	25.15	4.77	1.74
1896	257.1	24.97	6.44	1.9
1897	231.9	23.76	9.53	5.5
1898	169.1	17.2	8.41	4.43
1899	130.8	13.17	6.24	2.27
1900	105.4	11.58	1.06	0.18
1901	91.5	9.42	5.87	0.75
1902	85.1	8.33	4.74	1.42
1903	80.2	8.36	2.74	1.02
1904	49.5	5.45	2.49	0.68
1905	35.7	4.80	1.06	0.80
1906	27.7	3.55	1.71	0.46
1907	22.2	3.02	1.10	0.38
1908	15.8	2.37	0.86	0.48

If we glance at the curve showing the numbers constantly sick we will see at once a very marked increase dating back to the very beginning of the period under consideration. In 1880 and up to 1884 the number of men constantly inefficient on account of syphilis was less in India than in England, and the same is true of the invaliding rate. In 1884, however, the rates at home began to fall rapidly, whilst those in India still continued to rise, until in 1894 out of every 1,000 fighting men 25 were constantly inefficient from this cause, while in 1897 nearly 15 of these were invalided out of the country or out of the service. Since those dates the fall has been continuous and rapid. In 1908 only 2.37 per 1,000 men were constantly sick, and only 1.34 per 1,000 sent out of the country. The reduction in these figures is

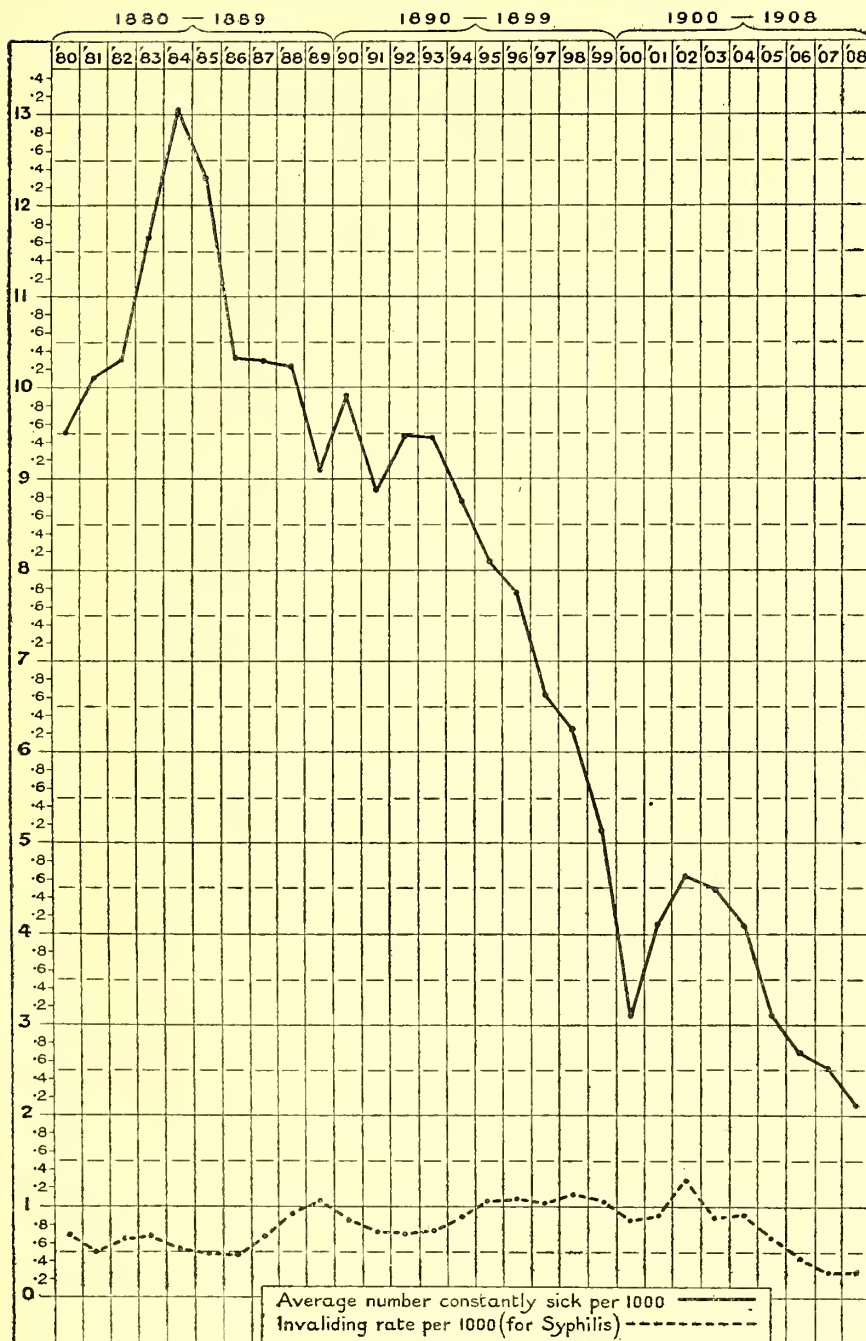


FIG. 3. Curves showing average number constantly sick, and numbers invalided, per 1,000 of strength, on account of syphilis (primary and secondary), in the army at home, for the years 1880-1908.

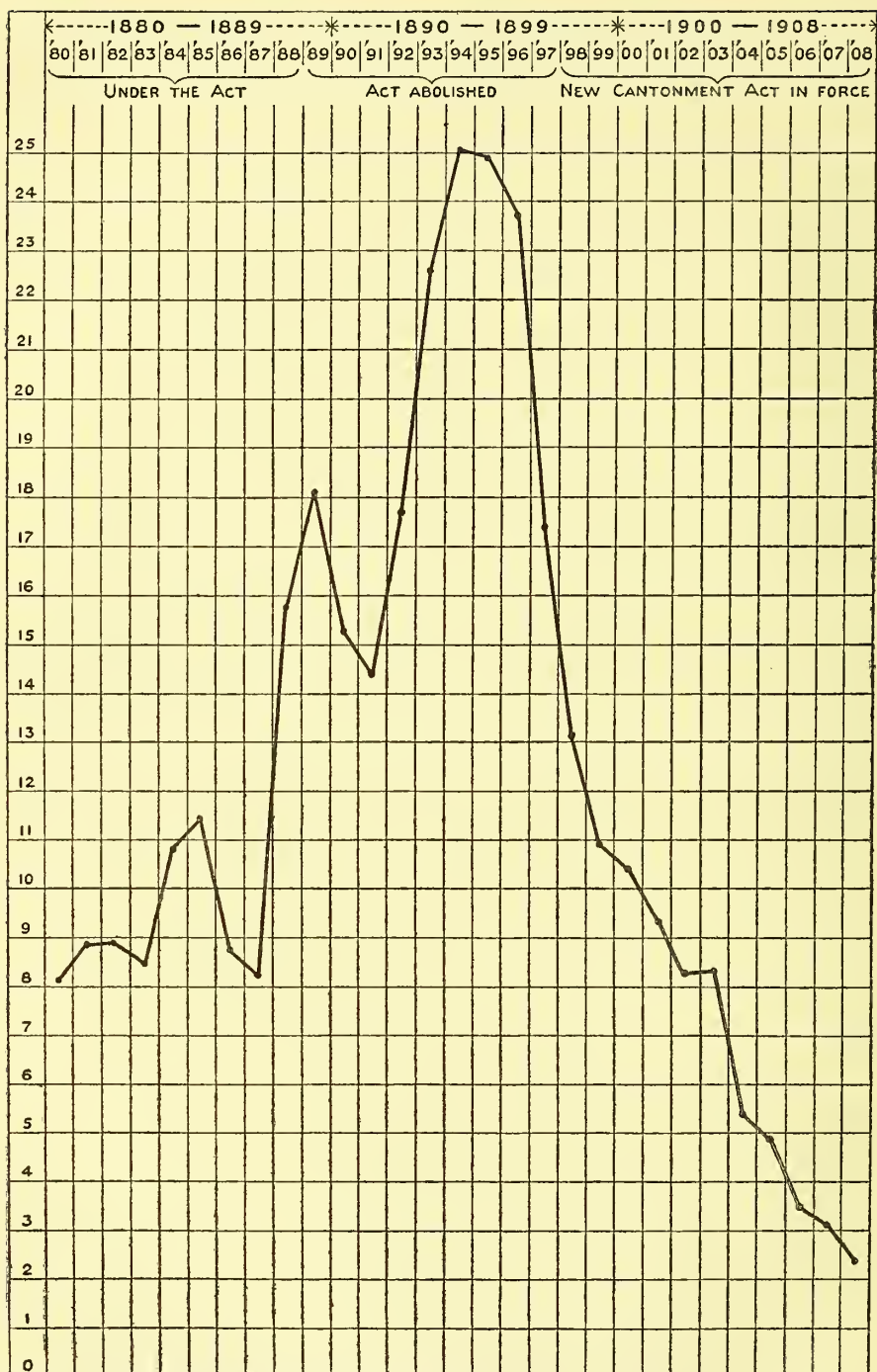


FIG. 4. Curve showing average number constantly sick, per 1,000 of strength, on account of syphilis (primary and secondary), in the army of India, for the years 1881-1908.

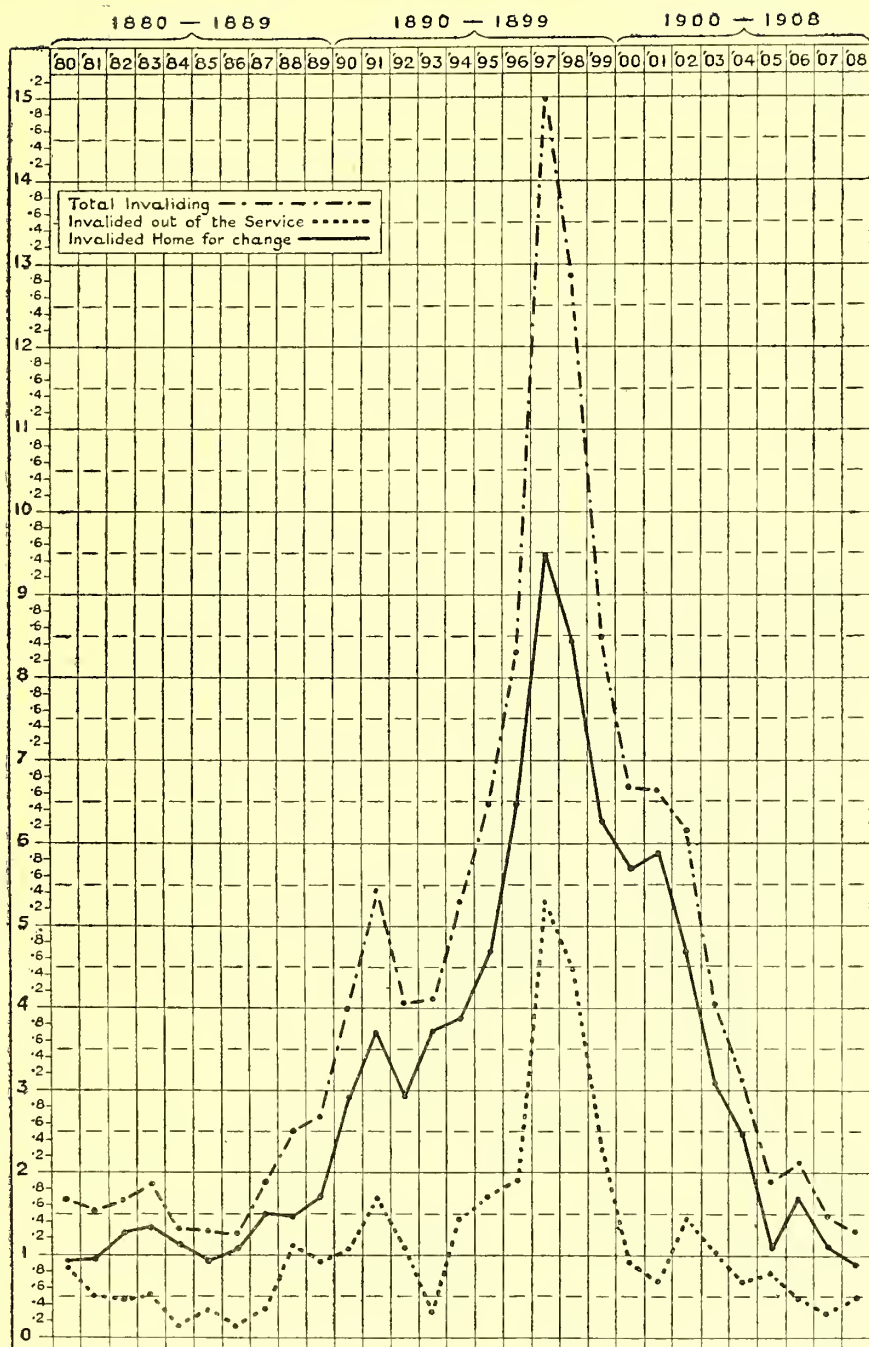


FIG. 5. Curves showing numbers invalided, per 1,000 of strength, on account of syphilis (primary and secondary), in the army of India, for the years 1880-1908.

one of the most striking events in military epidemiology. The original rise began under the old Contagious Diseases Acts, under which regimental brothels were regularly maintained, not only in cantonments, but on the march. It was neither more nor less rapid after the abolition of these Acts in 1889, and the reduction began some years before the passage of the new Cantonment Act of 1898. These curves are the most striking illustration of the absence of any connexion between the prevalence of venereal disease and legislation. Both rise and fall occurred independently of the active enforcement or the abolition of repressive measures. This is, however, a point that will be touched on later. The cause of this great improvement, or the causes rather, for there are more than one, are complex. The introduction of improved methods of treatment, more particularly that of deep injection, introduced originally by Colonel Lambkin, has played a considerable part, but the most important share in the reduction is to be attributed to social changes affecting the soldier's view of life. Personally I have no hesitation in attributing a great deal to the spread, not of teetotalism, but of temperance. I do not mean the joining of a temperance association, but the actual spread of true, unostentatious, and undecorated self-restraint. It has, it is true, often been alleged that venereal disease is, if anything, more prevalent amongst 'temperance' men than amongst others, and mainly because, saving money by temperate habits, they are in a position to be more extravagant in other directions. I am not concerned to prove or disprove this theory. I am speaking, not of the men who wear blue ribbons or temperance badges, but of the ordinary unregenerate soldier who likes his glass or even more of beer, but knows when, in the interest of his health and his character, to stop, and, knowing that, does stop. That this stamp of man is becoming more common in the army every day I am certain. The temperance which needs the support of badges and certificates is very often the connotation of a character that is too weak to stand alone, and, having its weakness buttressed up on one side, is only too prone to fall in some other direction. I repeat, therefore, that in my opinion the increase of true temperance in the army, that temperance which those who practise it do not think it necessary to publish *urbi et orbi*, is the chief cause of the diminished incidence of venereal disease in the army both at home and abroad. Other causes have no doubt co-operated, and these may be briefly detailed. In the first place lectures and discourses have been given to the men, by the medical officers in charge of the various military

units, regarding the nature and after-effects of venereal disease, and of the risks incurred by men who expose themselves to contagion. Young soldiers in particular are, on arrival at their stations, given advice and warned as to the dangers and temptations peculiar to service in India. The encouragement of healthy games, and outdoor exercises, has also led to the happiest results in diverting the natural exuberance of physical energy present in the young and healthy soldier. The increase of self-respect and *esprit de corps* among soldiers, largely the result of education, has also helped to this end, and it is becoming to be considered a disgraceful thing—bad form in fact—amongst the better class of men, to have suffered from venereal disease. A long sick-roll, when due to venereal disease, is recognized as a disgrace to the regiment, and as leading quite possibly to its non-employment in case of field service. At the same time a strict police supervision has been instituted in cantonments with a view to putting a stop to solicitation. The system of continuous out-patient treatment has also, as already stated, led to a reduced number of re-admissions, and to a diminished amount of invaliding. It is to these causes that we must attribute the fact that the admission-rate in 1908 was about one-eighteenth of that of 1895, whilst the number of men constantly sick had fallen from 25 to 2, and the total number invalided from 15 to a little over 1 per 1,000. Taking actual figures, the number of men permanently non-effective as a result of syphilis was 1,760 in 1896, the maximum year, and only 162 in 1908: the balance saved to the army being equivalent to one full battalion and about six companies at war strength. As I have already said, this decrease is one of the most striking facts in military epidemiology, and the officers and men of the British army in India have every right to boast of a change due not to any penal restrictions on unfortunate women, but to a general raising of moral tone, and the growth of a healthy self-respect, in the production of which both have taken their share.

I do not propose to study in detail the history of syphilis in the various smaller detachments of which our army is composed. Their numbers are too limited to enable us to avoid the fallacy produced by the changes in disease incidence, the result of the arrival of a badly disciplined or previously diseased regiment. The general trend of affairs everywhere has been the same as in the army as a whole, and in the armies at home and in the East Indies. In all the same gratifying reduction has occurred, and in all cases the decrease has been due to the same causes.

And yet when all is said, one is forced regretfully to confess

that the prevalence of syphilis, and of venereal disease generally, is greater in the British army than in any other except that of the United States of America. To take the latest figures available. In the year 1908 the army of the United States showed an admission-rate of over 26 per 1,000, the British army in the United Kingdom one of 20 per 1,000, whilst in 1906 for the German army the figures were 4·7, the Bavarian 3·6, the Austrian 16, and the Belgian 6·12. The Italian rate for 1902 was 14·5.

The remarkable difference between these various ratios is too great to escape notice, and demands some attempt at least at explanation. That it indicates any essential difference in the moral standard of the Anglo-Saxon race, and that maintained by continental nations, no one for a moment will argue. In all probability there is little difference between one Teutonic race and another in this respect, but at least it is certain that the young British soldier is not naturally five times as immoral as the German of the same age, or six times as wicked as the young Bavarian. There are two possible explanations. In the first place England and America are the only two great countries where some form of Contagious Diseases Act, or other, is not in force; in the second, they are also the only two nations which still rely on the voluntary method of recruiting, with its natural corollaries of greater individual leisure and liberty to the man in the ranks, and of higher pay. In addition these two peoples retain their men for longer periods of colour service than is the case in any other country. I do not feel inclined to attribute any marked influence to the enforcement of repressive measures. I will allude to this fact later when treating the general question of prevention, but I may point out that there is no evidence to show that in the case of the civil populations of the countries concerned there is any marked difference in the prevalence of syphilis. Personally I feel inclined to attribute the greater prevalence of syphilis, and of venereal diseases generally, in the two great English-speaking armies, to the fact that they recruit on the voluntary system. In the first place, this entails that the men cannot be kept so continuously with their noses to the military grindstone as can be and is done, certainly in Germany and France. In addition the longer term of service does not necessitate the same degree of intense application to military training, as is demanded by a two or three year term of enlistment. As a German officer is reported to have said to an English *confrère* when discussing this point, 'By the time we have finished with our young soldiers each day, they are not in a condition to think of anything but their beds

and a good night's rest.' Such a degree of strain is not necessary with the British soldier, owing to the longer time at his disposal, and it would undoubtedly adversely affect recruiting, at present rates of pay, though not, I think, quite to the extent anticipated. In addition to his greater leisure the British private has a great deal more pocket-money to spend than any other soldier except the enlisted man of the United States. Want of opportunity is the best preventive of syphilis, and want of money does not come far behind it. These conditions obtain in all continental armies, and they do not obtain in Great Britain or the United States. There is another influence that must not be forgotten, and that is the social surroundings of the men. In Germany and Bavaria, taking these for illustration merely, the soldier in the majority of cases puts in his time near his own home. Female society of a wholesome kind is therefore at his disposal. The young British soldier, once he has left the regimental *dépôt*, rarely serves in his own county, and the only female society that he can get is that of the less respectable women of a garrison town. The blame for this fact lies largely at the door of the nation at large. Matters have improved doubtless since the South African War, and the extended manœuvres of late years have made the people of the countryside better acquainted with the soldier, the excellence of whose behaviour on these occasions has been repeatedly testified to by local magistrates. The more intimate acquaintance with military affairs that it may be confidently hoped will result from the present Territorial scheme should also have good effect. The soldier in the ranks is a very young man, at a very impressionable age, his character in ninety-nine cases out of a hundred is what his associations make it, and his behaviour in an equal number that which he thinks people expect of him. When civilians, of a class in social status somewhat above that from which he himself comes, learn to look on the wearing of His Majesty's uniform as the honour that it is, and pay its wearer the respect that he deserves for being ready to give his life in defence of their purses, then the soldier will respond by behaving in a manner befitting that respect. The enormous majority do it now, and have always done so, with very little encouragement from the non-military population. With regard to the minority who do not, one may say to the nation at large in the words of Mr. Kipling—

'On your own heads, in your own hands, the sin and the saving lie.'

An important landmark¹² in the history of syphilis in the

British army are the reports of the sub-committee of the Advisory Board for Army Medical Services, appointed in 1903 to consider the question of the treatment of venereal diseases. The first report, which appeared in 1904, consisted of a valuable résumé of recent literature bearing on the subject. In the second report are presented the answers given by a number of medical men, both civilian and military, to certain questions bearing on the treatment of syphilis, and its relation to military life. Amongst the civilian witnesses were Mr. Jonathan Hutchinson and other leading specialists, and the information gathered was of the most valuable nature. The third report embodies reports from Major C. E. Pollock, Royal Army Medical Corps, on the Methods of Treatment employed in Foreign Military and Civil Hospitals, in France, Germany, Austria-Hungary, Italy, Russia, Sweden, Denmark, and Belgium. This volume also is of the greatest value. In the final report, which appeared in October 1905, the sub-committee summarized the information obtained by them, concluding that for military purposes inunction or injection was preferable to any form of administration by the mouth. It prescribed general rules for a scheme of continuous treatment for syphilis which might be carried out after the patient left hospital, whilst still performing his military duties. A plan was also suggested for a typical Venereal Hospital, or treatment block, which has been followed in subsequent new constructions, and used as a guide in cases where reconstruction of existing buildings has had to be carried out. The sub-committee also gave forth two very important opinions, which deserve to be placed on record. The first is 'that a patient suffering from syphilis without destructive lesions and under controlled mercurial treatment, is capable of undertaking all ordinary military duties'; and the second is to the effect that 'if the attack of syphilis has been of ordinary severity, especially if no destructive lesions have ever made their appearance, if no evidence of the malady has been observed during the previous six months, and a course of treatment has been carried out of the character recommended in this report, then the soldier may be permitted to proceed on active service in the field.' This last utterance must be accepted with a certain amount of caution. Very few medical officers would, I take it, be willing to pass a man as fit for active service who has suffered from a primary sore within the year, even though the secondary symptoms had been slight, and kept in check by treatment. The nature of the climate would also have to be considered. A longer period would have to elapse in the case of a man

going on a tropical campaign than in the case of one proceeding to a war on the Continent. On the whole it may be said that the sub-committee's work not only resulted in the collection of a considerable amount of useful and valuable information, but also did a great deal to stimulate interest in the treatment of venereal disease amongst officers of the Royal Army Medical Corps. A considerable share of the great improvement that has appeared in the British army of late years must be credited to the Advisory Board for Army Medical Services, and more especially to those members of it who worked on the sub-committee whose labours I have shortly sketched.

Table VI shows the number of admissions from the various stations occupied by the British army, for the decennia 1887-96, 1897-1906, and the quinquennium 1903-7. It will be seen

TABLE VI

TABLE SHOWING ADMISSIONS FOR SYPHILIS IN THE BRITISH ARMY BY STATIONS FOR CERTAIN PERIODS

	1887-96.	1897-1906.	1903-7.
United Kingdom	95.1	41.5	31.7
Gibraltar	48.4	24.1	18.3
Malta	36.4	24.9	14.2
Crete	—	17.0	12.6
Egypt	99.5	42.7	29.2
Cyprus		65.6	69.1
Bermuda	29.1	15.8	16.6
Jamaica	—	18.1	62.1
West Indies	90.5	—	—
West Africa	—	77.1	61.0
South Africa	134.4	19.6	23.4
Mauritius	76.3	81.2	77.0
Ceylon	130.1	56.1	24.9
South China	94.9	85.2	30.1
North China	—	101.7	85.9
Straits Settlements	235.2	72.8	40.6
India	189.7	99.0	43.0

from this table that there does appear to be a certain definite relationship between localities and the incidence of this disease, though whether this is accidental, or has any real epidemiological significance, I feel it impossible to say definitely. Taking the United Kingdom as furnishing a base-line it will be noted that Gibraltar, Malta, and Bermuda show in all three columns figures substantially below that line, and that to all intents and purposes Bermuda takes the lowest place throughout. (Crete might be

included in this comparison, but the garrison is too small to afford any useful information.) It is interesting to note, too, that all these stations are important naval as well as military stations, a combination that in the United Kingdom has always been considered to have a detrimental effect as regards prevalence of venereal disease. On the other hand, India and the Straits Settlements show a constant preponderance above the figures for the United Kingdom, whilst Ceylon and South China give higher numbers in two out of the three columns. The West Indies do not retain the 'good pre-eminence' claimed for them in the earlier days (*vide ante*, p. 22), since Jamaica (1903-7) and the islands as a whole (1887-96) are the same as, or at least no better in this respect than, the home stations. It is to be noted, too, that there is, particularly in the two earlier periods, a fairly constant ratio between the figures for the more important stations. In the quinquennium 1903-7, owing to the great general reduction, the relationship is somewhat changed, as might be expected. Thus Gibraltar throughout shows slightly more than half, Malta on two out of three occasions less than a half, Bermuda in the earlier periods one-third, and in the latest about a half, and India in the two decades double the number of admissions from the troops serving in the United Kingdom. It would not do to push this comparison too far, and for the other Commands, which have smaller and more fluctuating strengths than those just named, such a process would be misleading. The coincidence, even if it is nothing more, is interesting.

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CHAPTER IV

THE ARMY OF THE UNITED STATES

THE earliest figures available for the American army that I have been able to find are contained in an interesting paper on 'Continental Hospital Returns', published in the 'Pennsylvania Magazine of History and Biography for 1899', and written by John W. Jordan. These figures do not, however, give any direct idea of the prevalence of disease amongst the continental troops, since they show merely the numbers present in certain hospitals on certain dates, without reference to the strength of the Command from which the men were admitted. In the Lititz Hospital on January 22 there were 3 cases of lues venerea remaining amongst 157 total sick in hospital, not a very high proportion. As regards the General Hospital at Sunbury we have a fairly continuous record. On October 1, 1779, there were 13 cases of lues venerea out of a total of 126 cases in hospital; on October 3, 10 out of 163. (There seems to be some overlapping here. In the first case the figures are given from a return covering the dates between September 23 and October 1, in the second from a return extending from September 22 to October 3. The first refers merely to the General Hospital, the second to the General Hospital at Sunbury. The same regiments seem, however, to have sent their sick to both.) On October 18 there were 3 cases of lues venerea out of a total number of 81 in hospital. The Jersey regiments seem to have suffered most. Thus in the first return, that for the period September 23 to October 1, out of a total of 19 sick from four Jersey regiments 8 were due to venereal disease, no other regiment showing any proportion approaching this. In the second return these same regiments had 6 cases of venereal disease out of 23 total sick; on October 18, 2 out of 16. The returns of the hospital, which continue up to April 17, 1780, show no other cases of venereal disease.

The next notice I find in a 'Statistical Report on the Sickness and Mortality in the Army of the United States from January 1819 to January 1839', published at Washington in the year 1840. The earlier years of this period, up till 1829 in fact, are only referred to in a general manner. The accounts concentrate their attention almost entirely on yellow fever, and venereal

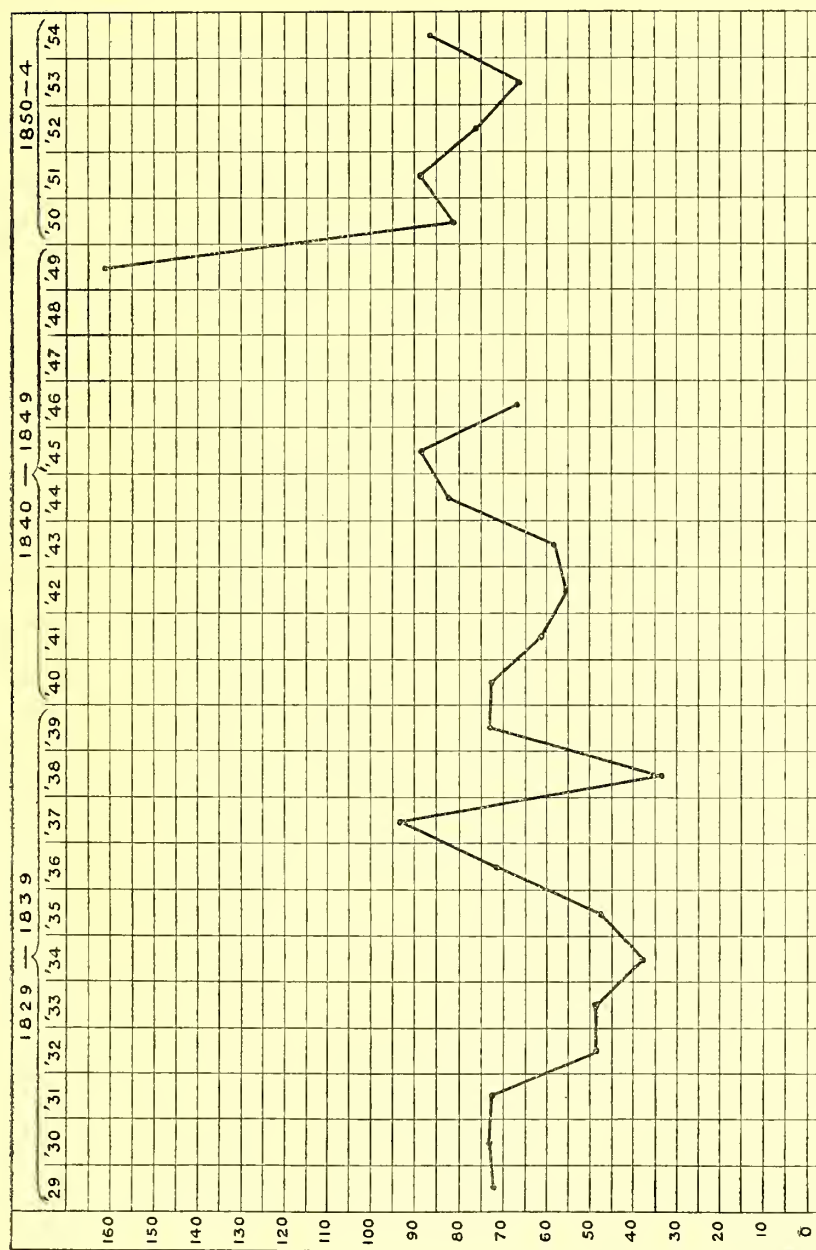


FIG. 6. Curve showing admissions, per 1,000 of strength, for all venereal diseases, in the army of the United States of America, for the years 1829-54.

diseases are not mentioned. From 1829, however, the admissions for all venereal diseases are given by stations throughout the army, and from them I have compiled the curve showing admissions, per 1,000 of strength, for the entire army of the United States between 1829 and 1854. (See Fig. 6.)

Before considering these figures, however, it is necessary to allude to the nature of the service on which the army of the United States was employed during these its earlier years of existence. This is well illustrated by the words of General Ewell,¹ 'During my twenty years of service on the frontier I learned all about commanding fifty United States dragoons and forgot everything else.' A force broken up in this manner might be expected to show great variations in the admissions for complaints of the nature of venereal diseases, which depend so much for their prevalence on the social surroundings of the men of which it is composed. Troops forced to endure the hardships and involuntary chastity entailed by a prolonged border raid, are not unlikely to indemnify themselves for the former by intemperance, and for the latter by unrestrained sexual excess on their return to civilization. On the whole, judging by later experience, the incidence of venereal disease must be considered high. The highest ratio is given by the year 1837, namely 94·62 per 1,000. This abnormal figure is as a matter of fact almost entirely due to a very large number of admissions at Fort Gibson in the Cherokee country, where the ratio for the year in question rose to 140 per 1,000. The low figure of the succeeding year is apparently due to the absence of a large number of troops in detached posts in Florida in the war with the Seminoles. From the year 1839 onwards, the admissions for primary syphilis are available in a 'Statistical Report on the Sickness and Mortality in the Army of the United States', compiled from the records of the Surgeon-General's office, embracing a period of sixteen years, from January 1839 to January 1855, published in 1856. A similar report published in 1860 carries the record on to the end of 1859. I must pause here to draw attention to these two reports. I have read them with great interest. They are a record of painstaking observation and work carried out by men who must have spent long years in isolated frontier posts, and who might well, in the absence of the stimulus afforded by professional society, have dropped, as the army surgeon has from time to time so much temptation to do, into a careless performance of routine duties. They contain ethnological information as to the habits of the native Indians which is of much value, especially with regard to the incidence of venereal disease amongst them.

From the abstracts for the different regions contained in these reports I have made out a curve for primary syphilis alone for the years 1839 to 1859. (See Fig. 7.)

It is, however, necessary to point out that the totals of the different regional abstracts do not correspond with the totals of the consolidated abstracts either as regards strengths, admissions, or deaths. The difference in the ratios is not so great as that in the actual figures. I have shown in the figure a curve for the totals of the regional abstracts as well as an incomplete curve drawn in accordance with the ratios of the consolidated abstracts. During the period covered by this curve the army led an existence very much the same as that described above. During the sixteen years between 1839 and 1859 the only time during which the army was exempt from hostilities was between the close of the Seminole War in the summer of 1842 and the beginning of the war with Mexico in 1846. The rise in the curve during these years is probably due to the fact that in the abstracts troops engaged in field operations are not included. The strengths rise from 5,193 in 1841 to 7,283 in 1842, and nearly 8,000 in 1843. The return of soldiers from the field here, as after the Mexican War, results in an increased ratio of admission.

Immediately after the great rise of the Mexican War we see a very marked fall to a little over 11 per 1,000. This period coincides with the occupation of Texas, California, Oregon, and the territory of Washington. The largest number of troops in the year in question, 1852, were in Texas and California, over 3,000 out of an aggregate strength of 8,000 being under semi-service conditions in those territories. This large section of the army naturally suffered very slightly from syphilis, especially the division in Texas, and this lowered the general total. The troops in California suffered considerably, it is true, in 1849, 1850, and 1851, but the strength was so low that the figures are of little importance. The small detachment of troops in Washington and Oregon suffered severely in all years except the year 1852. This fact is to be explained by the customs of the Indian tribes, more especially those of Astoria.² 'Chastity,' says Assistant-Surgeon Israel Moses, 'is unknown amongst the single and constancy rarely practised among the married.' And again, 'The scourge of these nations has been syphilis.'

It is interesting to note that the general opinion of American medical officers points to the introduction of syphilis to the Indian tribes by the agency of Europeans. Thus Assistant-Surgeon Charles C. Keeney writes in 1856,³ 'Lues venerea seems to be unknown amongst the various bands in this vicinity

(Northern California), while in the southern part of this State, on the borders of Mexico, this disease in all its protean forms is fast decimating the Indian race. Two causes may be ascribed for this: first, the Spaniards have freely circulated amongst the southern Indians, from the middle of the sixteenth century to the present time, and have as freely sown broadcast the seeds of this disease on the soil of the aborigines. Secondly, the old Spaniard seldom visited this northern soil, and if he ever did this colder and purer climate rendered the virus less infectious and more ready to give way under the influence of natural causes.' Similarly Assistant-Surgeon B. I. D. Irwin, writing in 1859, states,⁴ 'Some thirty years ago, when the Apaches first commenced their depredations against the Sonoreans, many of them contracted syphilitic disease from their female captives, which spread with fearful effects amongst their own people, who, to get rid of this dreadful scourge that was disseminating itself among them, either abandoned the unfortunate victim to die of starvation or, as in many instances, deprived him of life.' The introduction of syphilis amongst the Comanches is attributed to a similar cause.⁵ This fact is interesting in connexion with the other fact that syphilis undoubtedly seems to have been prevalent in Mexico and Peru from an early date.

The curves given in Fig. 7 bring the history of syphilis in the American army up to the date of the outbreak of the Civil War. It will be noted that for the last seven years of this 'antebellum' period the rate of admissions from these diseases had been rising steadily. This rise coincides to a certain extent with a considerable increase in the strength of the troops in New Mexico and California, in both of which districts the ratio of admissions was very high.

Coming now to the period of the War of the Rebellion the material at disposal is very considerable. The 'Medical and Surgical History of the War of the Rebellion' gives the admissions for syphilis by months for all the different divisions of the army from May 1861 to June 30, 1866, that being the close of the financial year in which the war officially terminated; a date which can be fixed by the presidential proclamation of April 3 of that year. From these figures I have compiled the curve on Fig. 8, which shows the admissions for syphilis, per 1,000 of strength, for the entire Federal army for the period indicated.

I have intercalated in the curve the more important engagements of the war, and it will be noted that where these are most frequent the admissions for syphilis are the most scanty; a concurrence of events which was, however, only to be anticipated. Naturally

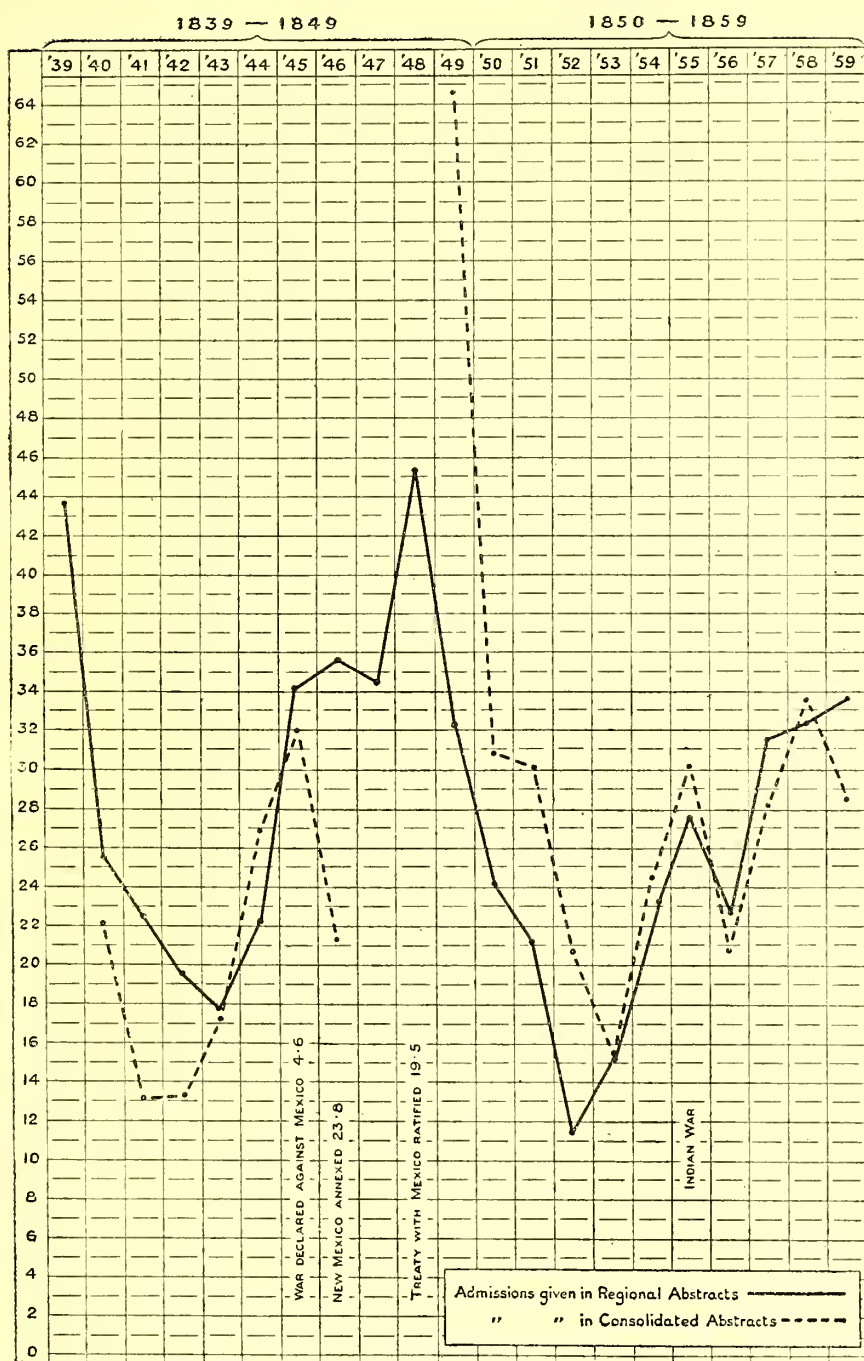


FIG. 7. Curve showing admissions, per 1,000 of strength, for primary syphilis, in the army of the United States of America, for the years 1839-59.

also the higher figures show themselves in the winter months, the lowest in the more active months of the summer. An interesting exception to this rule, however, is seen in the month of April 1864, which gives the highest admission-rate of any month between the beginning of serious operations and the surrender at Appomattox Court-house in April 1865, the virtual close of the war. This high figure coincides with a considerable addition to the strength of the Federal forces in the army of the Potomac, the result of the more rigid conscription instituted at that time, and with the draft of 500,000 men directed to be formed in three years by President Lincoln in February. A similar rise occurs in a curve showing the admissions by months through the war for all venereal diseases, and the remark is made in the letterpress of the history that the variations in that curve are mostly to be attributed to the arrival of fresh levies, or the return of old soldiers from furlough. It appears on the whole, however, more probable that, as is usually the case, the prevalence of venereal diseases varied in inverse ratio with the amount of work demanded of the men and their exposure to the privations of field service. The close of the war was signalized by a very marked increase in the admissions for these diseases, an increase that lasted over several years. It is interesting to note that this increase was by no means a temporary one. Its effects are seen in the curve on Fig. 9 to extend over a considerable time, at least till 1874; it might almost be said until 1886. A reaction of this nature is the rule after severe campaigns, and would naturally be more marked in the case of a long service army than in one composed of men enlisted for short periods of colour service only.

An interesting analysis of the numbers of men rejected for syphilis (whether primary or not is not stated) is given in 'Statistics Medical and Anthropological of the Provost-Marshal-General's Bureau'.⁶ As regards country of nativity it is noticeable that of those nationalities contributing any considerable number of recruits the Irish gave the largest number of rejections on this account; close behind them came Scotland, England, British America, and France, there being little to choose between any of these countries. Of important foreign nations Germany gave by far the lowest proportion. Out of 54,000 odd only 6,270 men had to be rejected on this account, that is, about one-third of the rejections in the case of Irish recruits. As regards natives of the United States the loss due to this disease was comparatively small, not much more than half that of Germany. It must, however, be remembered that the natives of the United States

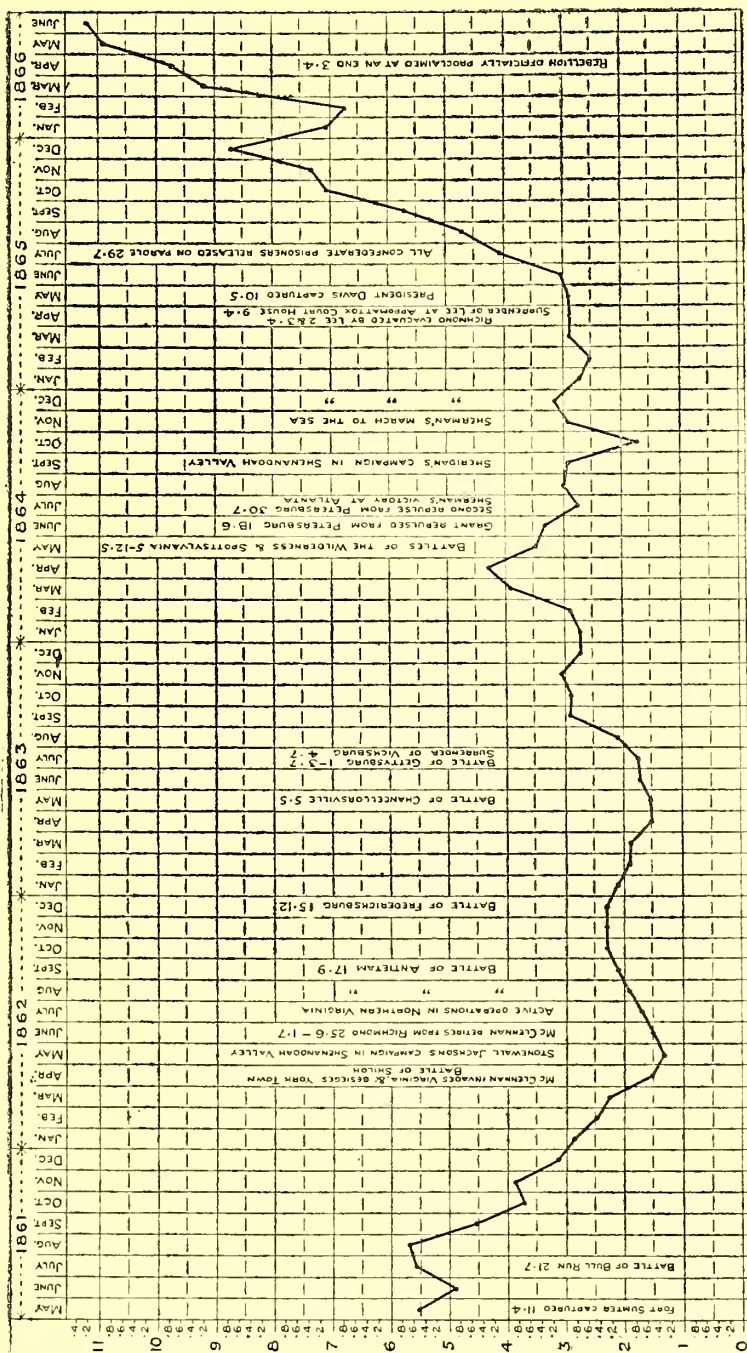


FIG. 8. Curve showing admissions, per 1,000 of strength, for syphilis (primary and secondary), in the Federal army, during the War of the Rebellion, by months from May 1861 to June 1866.

were in a far greater proportion married men, and also that foreigners belonged, more especially in the case of the British Isles, to the more adventurous and less well regulated classes of the community. The conclusion drawn in the report is as follows :⁷ 'The typical syphilitic man, so to speak, is shown to be the unmarried man, of light complexion, 20 to 25 years old, five feet three inches to five feet seven inches in height, and a native of a southern country, or possibly of Great Britain ; while the typical rheumatic man is the married man, of dark complexion, over 40 years of age, very tall, and a native of a northern country.' As a matter of fact the above deduction is, as regards the 'southern country', founded on insufficient data, and if any reliance is to be placed on these figures the 'typical syphilitic' should be either an inhabitant of the British Isles or France. It may be noted that an interesting experiment in prevention was made during the war, which, as the only systematized effort in this direction in connexion with the United States army, deserves mention.⁸

We now come to the history of syphilis in the army of the United States since the War of the Rebellion. The curve on Fig. 9 illustrates this and shows a steadily decreasing ratio of admissions, broken it is true by a few unimportant rises, lasting till the declaration of war with Spain in 1898.⁹ Since then there has been a marked increase in the admissions for syphilis. This can only be attributed to the contact of the soldier with the less civilized races of Cuba and the Philippines. This of course merely confirms the experience of the British army in India and elsewhere.

As regards different districts, it is interesting to note that since 1888, Texas, which, as has been previously noted, was in earlier years comparatively free from venereal disease, has shown a very high incidence of syphilis, while the troops in the less settled districts seem generally to have a higher ratio than those stationed amongst the more orderly populations of the Eastern States. The difference is not, however, great.

The Surgeon-General's reports for the years 1892 and 1896 contain detailed information as to the relative prevalence of disease ('all venereal diseases' in the first year, and 'syphilis' in the second) amongst the various nationalities of which the army is composed. The order shown is somewhat interesting. The first four in each list are Canadian, United States, French and Danish, in the order given. The fifth place in the first list is occupied by the Scandinavian races, in the second by the Irish. The English are sixth in both years. After this the uniformity is less marked, but the Austrians, who are eighth on the first list,

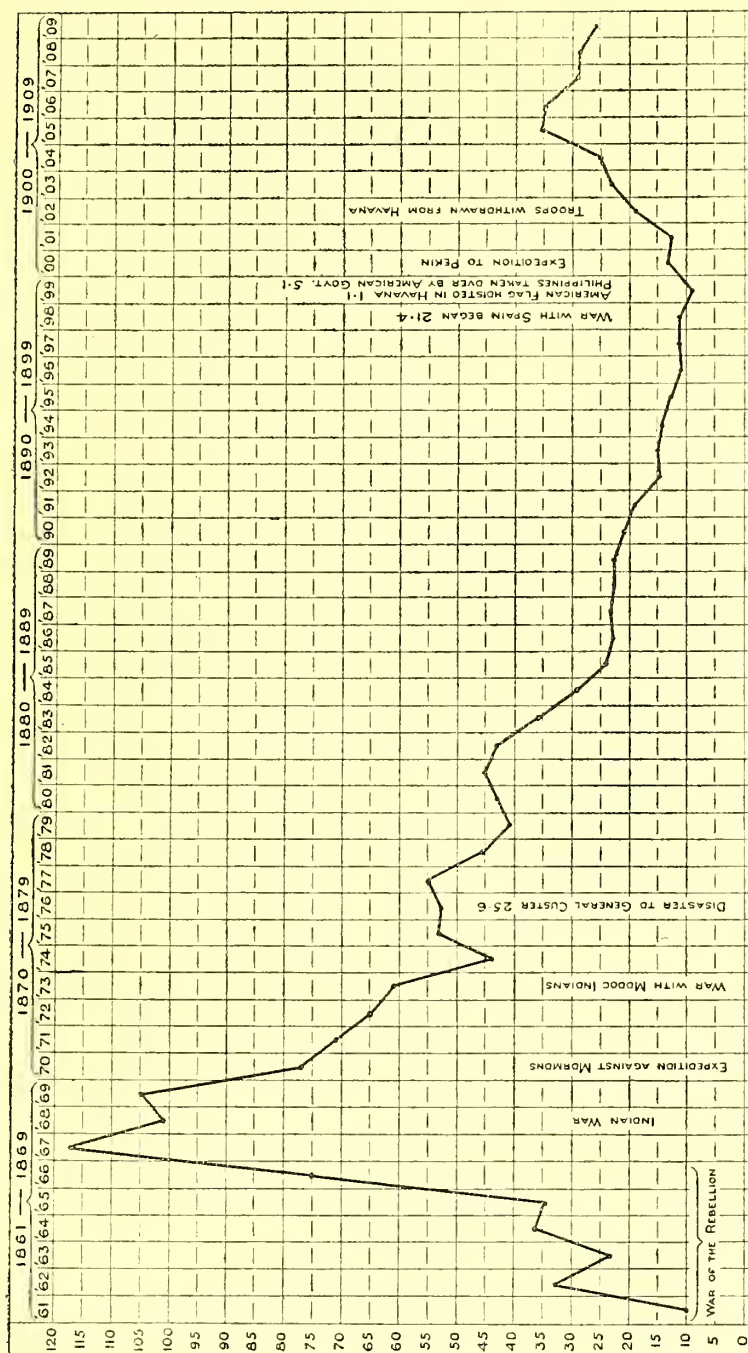


Fig. 9. Curve showing admissions, per 1,000 of strength, for syphilis (primary and secondary), in the army of the United States of America, at home and abroad, for the years 1861-1909.

are seventh in the second, whilst the Germans, who are tenth in the former, are ninth in the latter series. This somewhat regular distribution seems to point to a relative racial predisposition to the disease, and it is to be hoped that further returns may be made showing this racial distribution, since if any marked uniformity were shown a valuable light might be thrown on racial disease proclivities.

TABLE VII

TABLE SHOWING STRENGTH, ACTUAL ADMISSIONS, AND ADMISSIONS PER 1,000 FOR THE ARMY OF THE UNITED STATES ON ACCOUNT OF SYPHILIS

<i>Year.</i>	<i>Strength.</i>	<i>Admissions.</i>	<i>Admissions per 1,000.</i>
1839	4,235	186	43.92
1840	5,908	151	25.56
1841	5,193	116	22.34
1842	7,283	143	19.64
1843	7,998	144	17.99
1844	7,859	242	22.07
1845	5,944	203	34.15
1846	3,477	125	35.95
1847	2,991	103	34.44
1848	3,996	196	49.05
1849	7,270	233	32.04
1850	7,659	185	24.15
1851	7,944	168	21.16
1852	8,169	94	11.51
1853	7,447	114	15.31
1854	6,718	156	23.22
1855	11,297	314	27.89
1856	12,629	286	22.65
1857	12,740	400	31.39
1858	13,860	449	32.39
1859	14,480	492	33.98
1860	—	—	—
1861	41,556	416	10.00 ^a

The figures up to 1859 inclusive refer only to Primary Syphilis.

The figures in Table VII, from which the curve on Fig. 8 has been constructed, have been kindly furnished me, as far as the years 1861 to 1885 are concerned, by Lieutenant-Colonel J. R. Keary, Medical Corps, United States army. In the letter with which he forwards these figures, he furnishes an explanation of the discrepancy alluded to on p. 49, as regards the figures in the Regional and Consolidated Abstracts of the Statistical Reports, as follows:

‘Conflicting reports in the tabulations for 1840 are probably accounted for under “Appendix” p. 637 in the volume, Senate Ex. Doc. No. 96, 34th Congress “Statistical Report of Sickness and Mortality in the United States army, years 1839 to 1854,” wherein is stated, “No attempt has been made to incorporate in this report the medical statistics of the Florida War, 1835–42.”’

‘The divisions referred to in this report are not complete without the data for Division of Florida, and its statistical tabulations begin therein for the year 1849.’

^a For May and June only.

<i>Year.</i>	<i>Strength.</i>	<i>Admissions.</i>	<i>Admissions per 1,000.</i>
1862	279,371	9,044	32.53 ^a
1863	614,325	14,278	23.25
1864	619,703	22,486	36.27
1865	574,022	19,647	34.23
1866	99,080	7,511	75.77
1867	40,183	4,686	117.00
1868	45,022	4,545	101.00
1869	37,197	3,929	105.62
1870	29,022	2,236	77.11
1871	29,365	2,047	70.59
1872	24,101	1,575	65.63
1873	24,897	1,544	61.79
1874	25,786	1,128	43.38
1875	21,939	1,182	53.73
1876	21,718	1,147	52.86
1877	23,383	1,283	54.83
1878	20,813	954	45.59
1879	21,848	885	40.41
1880	22,096	948	42.89
1881	21,174	969	45.71
1882	20,725	875	42.47
1883	23,439	835	35.62
1884	24,034	718	29.87
1885	24,138	600	24.86
1886	21,944	—	22.44 ^b
1887	—	—	22.98 ^c
1888	21,601	482	22.31 ^d
1889	22,310	—	22.32 ^e
1890	22,591	—	21.56
1891	21,910	—	18.89
1892	20,909	—	14.49
1893	21,437	—	15.11 ^f
1894	22,429	—	14.04 ^g
1895	22,904	—	12.62 ^h
1896	23,195	—	10.91 ⁱ
1897	23,014	—	11.56 ^k
1898	23,253	—	11.01 ^l
1899	43,307	—	9.33 ^m
1900	98,635	—	13.39 ⁿ
1901	26,648	3,323	12.47 ^o
1902	85,357	—	19.75 ^p
1903	71,679	1,676	23.36 ^q
1904	59,671	1,525 ^r	25.56 ^s
1905	55,619	1,953	35.11 ^t
1906	53,573	1,869	34.89 ^u
1907	53,249	1,534	28.80 ^x
1908	50,705	1,436	28.32 ^y
1909	62,263	1,592	25.57 ^z

NOTE. The dates after 1861 refer to the date of the Report of the Surgeon-General, and correspond to the fixed year closing on June 30. The dates are those given on the outside cover of the various reports, and it was considered better, for purposes of reference, to adhere to these.

^a For year ending June 30. ^b Surgeon-General's Report, 1886, p. 616.

^c Ibid. 1887, p. 688. ^d Ibid. 1888, pp. 761, 801. ^e Ibid. 1889, pp. 857, 858.

^f Ibid. 1893, Table XI. ^g Ibid. 1894, Table XIII. ^h Ibid. 1895, Table XII.

ⁱ Ibid. 1896, Table XII. ^k Ibid. 1897, Table XII. ^l Ibid. 1898, Table XII.

^m Ibid. 1899, Table IV. ⁿ Ibid. 1900, Table VIII. ^o Ibid. 1901, Table III.

^p Ibid. 1902, Table III a. ^q Ibid. 1903, Table III b.

^r Includes syphilis, primary, secondary, tertiary, and hereditary.

^s Surgeon-General's Report, 1904, Table IV. ^t Ibid. 1905, Table V a.

^u Ibid. 1906, Table V a. ^x Ibid. 1907, Table III b.

^y Ibid. 1908, Table III b. ^z Ibid. 1909, Table No. 70.

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CHAPTER V

THE ARMIES OF THE CONTINENT OF EUROPE

FOR the French army the chief authority is the annual *Statistique Médicale de l'Armée*, which in its later volumes gives a series of curves illustrating the incidence of the various forms of venereal disease since 1875, as well as maps showing their relative prevalence in the different army corps districts. Similar curves and maps are given in Schweining's useful brochure, and a map showing the incidence of disease locally for all venereal diseases and for syphilis between 1899 and 1903. The *Statistique Médicale* includes in its map the district of Algeria and Tunis, giving as well separate curves for this section of the army. As regards all venereal diseases the French army shows very badly at the earlier part of this period, but since the early eighties of the last century, though the French army has never yet shown such low figures as the German and Bavarian armies are able to do, nevertheless it has constantly been one of the first four armies on the Continent in this respect. As regards syphilis the position is not so satisfactory. The admission-rate per 1,000 of strength in 1876 was 7·4, and in 1905 and 1906 7 per 1,000 of strength, and during the intervening period the figure has more often been above than below this level. In 1877 it was only 6·6, but from that date onwards to 1895 it never was down as low as in 1876, and on three occasions, 1879, 1882, and 1883, it was over 10 per 1,000. From 1895 onwards the ratio was steadily below 7, and in 1897, 1898, and 1903 below 6. The last two years for which figures are available show, as already stated, ratios of 7 per 1,000. On the whole, then, it must be said that the incidence of syphilis in the French army shows no very marked decrease, and in fact may be considered to have been practically stationary during the last thirty years.

As regards Tunis and Algeria syphilis has increased steadily from 7·4 in 1876 (a figure identical with that for France) to 19 per 1,000 in 1906, and whereas venereal diseases as a whole have always been much worse in these colonies than in the army serving in France itself, the incidence of syphilis has advanced

from the equality of 1826 as between these two classes of troops to a ratio of 2 to 1 at the present day.

In France itself, the greatest incidence of syphilis is shown by the Third Army Corps with its head-quarters at Rouen. In the district occupied by this army corps lies the great seaport of Havre. The district in which Marseilles is situated, that of the Fifteenth Corps, comes second in order of prevalence. With the exception of the Third the other army corps occupying the northern part of

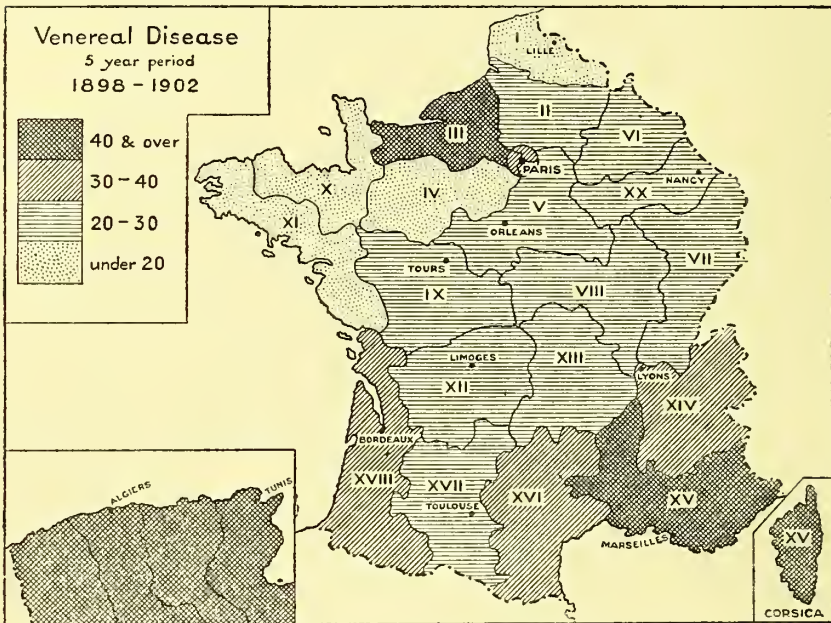


CHART I. Sketch-map of France showing prevalence of venereal diseases in the various army corps for the five-year period 1898-1902.

France show low figures for syphilis. The Tenth and Eleventh Corps, occupying Normandy and Brittany, return the lowest incidence, while close behind these come the First, Second, and Fourth Army Corps. These corps form as it were a cordon of low prevalence round the highly infected Third Corps, a cordon broken only by the intervention of the Military Government of Paris, which as representing the capital naturally shows a high proportion of admissions for syphilis. The Eighth Army Corps, stationed in the Bourbonnais and Lyonnais with head-quarters at Bourges, also gives a low figure, but the army corps in the centre and south of France suffer considerably from this disease. (See Charts I and II.)

Of individual units the *Sapeurs-Pompiers* and the *Garde*

Républicaine persistently return the highest admissions, whilst the *Zouaves*, *Chasseurs d'Afrique*, the African battalions of the Nineteenth Army Corps, the *Spahis*, and the *Tirailleurs Algériens* also suffer severely.

The earliest figures for the Prussian army are those given by Schweining in his work already referred to. These refer only to the garrisons of Berlin and Potsdam for the years 1843 to 1860, and as they merely furnish the actual admissions for venereal

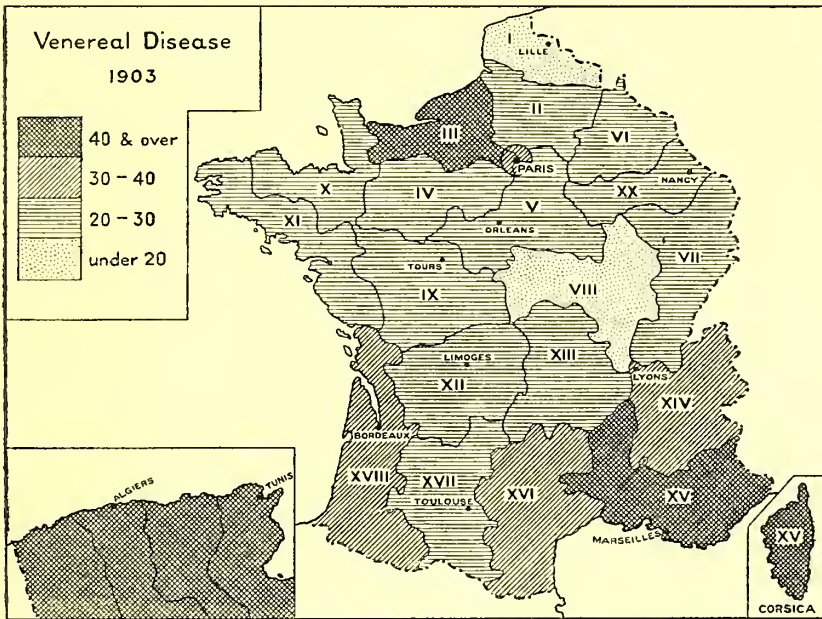


CHART II. Sketch-map of France showing prevalence of venereal diseases in the various army corps for the year 1903.

diseases in these garrisons for the years named without any statement of the strengths involved they possess little statistical value. Presuming that the strengths remained fairly constant there would appear to have been little if any variation in the prevalence of venereal diseases between 1843 and 1847, though a slight gradual tendency to increase may perhaps be observed in the Berlin garrison. It is noted that brothels were closed in the year 1846, but there was no marked rise in the Potsdam garrison that year or the next, nor is the slight increase in the Berlin garrison greater than that which occurred between 1844 and 1845, when brothels existed. There was a marked rise in both garrisons in 1848 and 1849, but it is to be remembered that

during these years there was considerable unrest in the kingdom of Prussia. Berlin was on the verge of insurrection during the spring and summer of 1848, and was actually in a state of siege in November of that year. It is probable, therefore, that both garrisons were considerably raised in strength during this period. In 1850 brothels were once more instituted, and the admissions fell till 1854, when the strengths were once more augmented, after which the number of cases naturally once more increased.

The first reliable figures for the Prussian army are those furnished by the *Preussische Militärärztliche Zeitung* for 1860, quoted by Schweining, where we see that the total number of cases was 44 per 1,000. The figures for different corps vary within fairly wide limits. The highest rates, 55 and 54 per 1,000, are shown by the Guards and the Third Army Corps, stationed in and around Berlin, followed by the Fifth and Sixth near Posen and Breslau. The lowest rates are shown by the First and Seventh Army Corps, 29 and 22 per 1,000 respectively, figures which compare favourably with the rate for the army generally until the late '90's.

From 1867 the figures for venereal diseases, as a whole, are continuous, with the exception of the years 1870 and 1871, the years of the Franco-Prussian War. Both as regards venereal diseases as a whole, and syphilis in particular, the record can only be looked on as one most creditable to the Prussian army. The later '70's are marked, it is true, by a decided increase attributed by the authorities to the prevailing depression of trade and the consequent throwing into unemployment of considerable numbers of women, with as one result an increase in prostitution. Since 1881, however, the fall has been, with the exception of a slight rise in 1893, unbroken, and throughout the whole period, that is since 1874, the Prussian army has enjoyed the lowest admission-rate of any army in Europe, as regards all venereal diseases. As regards syphilis its pre-eminence has not been so well marked, but still it has always ranked as one of the first four in this respect (the other three armies being the French, Belgian, and Bavarian), and since the opening of the twentieth century it has been actually the lowest. So great has been the improvement when the entire period since 1860 is taken into account, that in the quinquennium 1898-9-1902-3 the highest figure of admission given by any Prussian corps, the Fifteenth, is only fractionally higher than that given by the Seventh in 1860, the best in the army at that date, whilst the rate for the whole army has fallen by 50 per cent. This highly satisfactory and creditable state of affairs

is attributed by Schweining to the continuous co-operation of the Ministries of War and the Interior, and the recognition by them of the importance of energetic and combined preventive action.

As regards the other armies of the German Empire the two Saxon Corps, Twelfth and Nineteenth, show decidedly high figures for all venereal diseases as well as for syphilis in particular. In the quinquennium 1898-99—1902-3 these corps gave a rate for all venereal diseases of 31·9 and 26·3 per 1,000 respectively. But though these figures seem bad when compared with those for other corps of the German army it is noteworthy that the best army corps of Austria and Italy, and eleven out of fourteen of the Russian army corps, show figures far worse than these.

The yearly reduction in the number of admissions for all venereal diseases has not, it is true, been so great as in some other armies, for instance those of Belgium, France, and the Netherlands, but this is a natural corollary from the low number of admissions with which the series begins. This effect is well shown when the figures for syphilis only are considered. The only army showing a greater annual reduction than the Prussian is the British army. Unfortunately this can be easily explained on the grounds that we may expect to find most improvement where there is most room for it.

As in the case of all Continental armies, recruited on the system of universal service, the admissions for venereal disease in the German army show a definite seasonal variation. The rate throughout the year remains fairly constant, but shows a marked rise in October, the result of the annual batch of recruits joining the colours in that month. It is noteworthy that during this month the German army shows a higher rate of admissions for all venereal diseases than either the French, Dutch, or Bavarian armies, and is practically on a level with the Russian army at its period of annual maximum (December in this case). This would seem to point to the fact that the low rates obtaining in the Prussian army are due neither to a higher moral standard obtaining in the population generally, nor to municipal preventive regulations, but to causes operating purely on the soldier in the ranks. Schweining points out that 15 to 17 per cent. of all venereal disease is due to recruits enlisted while actually suffering from disease at the time of enlistment, while another 6 per cent. is due to relapses of disease originally contracted prior to enlistment. He further draws attention to the fact that the proportion of recruits actually suffering from disease at the time of enlistment is higher than the proportion of men constantly absent from

duty on this account, a fact which points to the obvious conclusion that venereal diseases are more prevalent amongst the civil population at the military age than amongst the men in the ranks of the army. This statement is true not only as regards the army as a whole, but as regards individual corps and even garrisons, when these are compared with the civil population from which they respectively draw their recruits. Schweining draws the very just conclusion that the *fons et origo* of venereal disease is to be sought in the civil population and not in the army, and that so far from the army being considered answerable for the spread of these diseases, it is the civil population rather that should be considered as responsible for the prevalence of disease in the ranks of the army.

The proportion of recruits actually enlisted with syphilis depends very largely on the size of the town in which they have been brought up. Thus in towns of 100,000 inhabitants and over the proportion of syphilitic recruits to the total number enlisted was, in the three years 1903-5, 3·9 per 1,000. In towns with from 25,000 to 100,000 the proportion fell to 1·7 per 1,000, whilst in smaller towns, villages, and the country districts generally the rate fell to 0·78 per 1,000. The figures for the Bavarian army are somewhat lower, viz. 2·5, 1·4, and 0·61 per 1,000 for each of the three classes of towns referred to. The greatest amount of syphilis was shown (five-year period 1898-9—1902-3) amongst the recruits for the Nineteenth and the First Bavarian Army Corps. The greatest amount of venereal disease is shown in the years 1903 to 1905 amongst the recruits of the Third, Twelfth, Nineteenth, and Ninth Army Corps. The explanation lies in the fact that the Third Army Corps draws its recruits mostly from the city of Berlin and its environs, the two Saxon corps (Twelfth and Nineteenth) from the thickly populated industrial districts of that kingdom, and the Ninth Army Corps from the seaports of Hamburg and Altona. On the other hand, the lowest figures are given by the Twelfth and Fourteenth from Alsace, Baden, and Wurtemberg, the Seventeenth and Second from Pomerania and the neighbourhood of Danzig, and the Second Bavarian stationed near the frontier. It is interesting to note that the Eleventh Army Corps, which, as regards all venereal diseases, shows a relatively healthy set of recruits, being continuously, in the three years under review, amongst the first four in this respect, shows a high percentage of syphilis. The same remark applies, though to a less extent, to the Seventh, Tenth, and Fifteenth Corps. In other respects there does not seem to be much variation

between the relative position of army corps in the matter of prevalence of syphilis only, or of venereal diseases as a class. (See Charts III and IV.)

When we come to consider the prevalence of syphilis amongst men actually in the ranks we find that the northern and eastern corps are the most affected. It may, in fact, be stated that with one exception all corps showing a higher admission-rate than

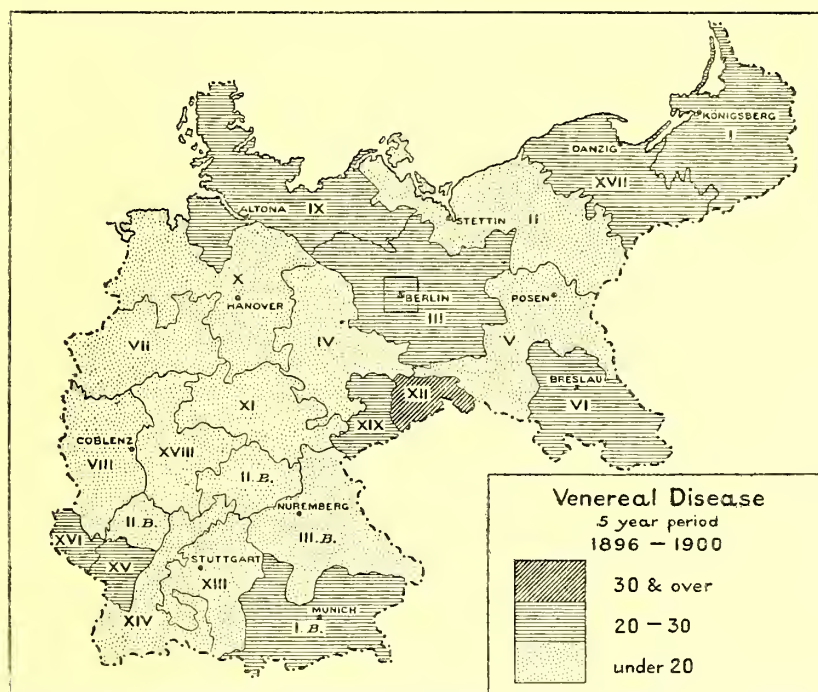


CHART III. Sketch-map of the German Empire showing prevalence of venereal diseases in the various army corps for the five-year period 1896-1900.

4 per 1,000 (1898-9—1902-3) lie to the east of longitude 12° E., and north of latitude 51° N.

The most healthy corps in this respect are the Thirteenth and Fourteenth, already referred to as showing a low percentage of syphilitic recruits.

The distribution of syphilis amongst recruits does not entirely accord, however, with the above, being more marked in the case of the western corps, with the exception of Baden and Wurtemberg, than in those of more easterly stations.

A few words may be said about the incidence of venereal disease

in the Franco-Prussian War. Taking the whole period of the war, from July 16, 1870, to the end of June 1871, the admission-rate for all venereal diseases was 42 per 1,000, the monthly average for the whole of the war being about 3.75 per 1,000. During the months of active operations in the field, however, the average was decidedly lower, being about 2.5 only for the months August, September, October, and November of 1870. The later months

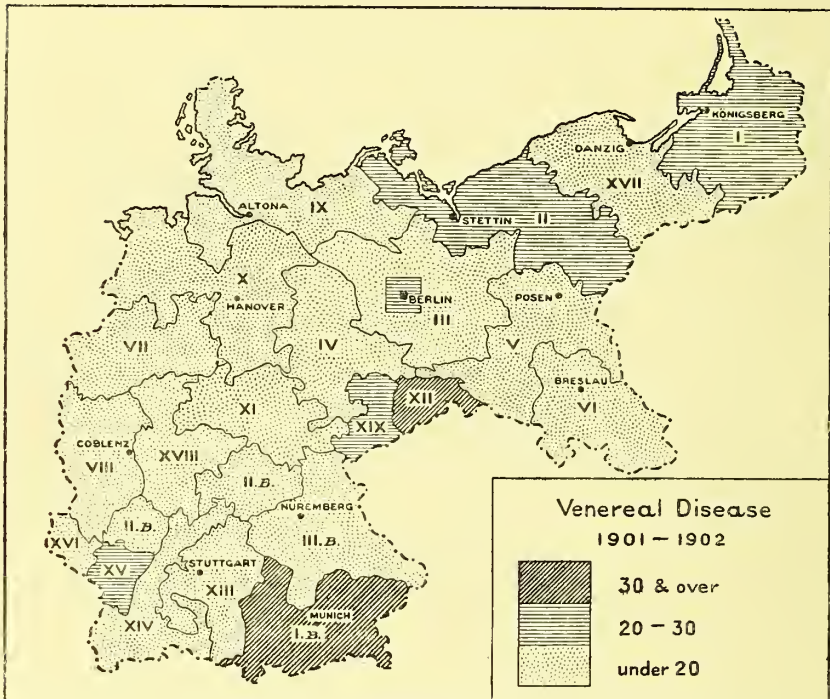


CHART IV. Sketch-map of the German Empire showing the prevalence of venereal diseases in the various army corps for the years 1901-1902.

in the vicinity of Paris helped to raise the rates considerably. As regards arms of the Service, the highest rate was given by the Fortress Artillery, viz. 88 per 1,000; the Cavalry of the Landwehr also showed a high rate, 52 per 1,000. The Train and the Field Pioneers give 57 and 60, while the mobile Medical Units show the lowest rate of all organizations, 38 per 1,000. Of the various nationalities of which the army was composed the Hessian army showed the extremely low rate of 19 per 1,000. To those whose only idea of a 'Hessian' is gathered from the highly coloured stories of the behaviour of the troops of that name in the

American War of Independence, this fact will come as a surprise. The Bavarian army also gave a very low figure, 21·6.

Preventive measures were instituted on the lines of communications as early as October 1870, and, after the capitulation of Paris, amongst the various cantonments generally. These consisted in frequent inspections of the troops, a careful watch on prostitutes, and their examination by local authorities under the supervision of a German military medical officer. Prostitutes from outside localities entering cantonments were ejected.

Continuous statistics are available showing the incidence of venereal diseases generally in the Austro-Hungarian army since the year 1870, and that of syphilis in particular since 1873. As regards the former, namely, the entire class, it is to be noted that though in the earlier years, up till 1876 that is, the Austro-Hungarian army held a very favourable position, being surpassed by the German and Bavarian armies only; in that year the gradual increase of admissions, dating back to the year before, combined with a steady decrease in the same in the armies of France and Belgium, brought it into the fifth position amongst the important armies of Central Europe. This rise continued steadily until 1879, since when there has been a steady but not rapid, and of later years not well sustained, fall in the number of admissions. The highest figure reached was 81·4 in the year 1877, whereas the ratio in 1907 had fallen to 54·2. Compared with the proportions shown by the other armies of Germany, France, Belgium, Russia, and the Netherlands, this figure is decidedly high, and there does not appear, moreover, to be any distinct tendency to reduction. As regards syphilis the case is even worse. The admission-rate of the army of the dual empire has always since 1879 been higher than that of any other European army on the Continent (with the doubtful exception of Italy), and, a more serious matter still, has shown a tendency if anything to rise. In 1873 the ratio of admissions for this disease was 14·7 per 1,000. The years 1875, 1876, and 1877 were marked by a steady increase, until in the last-named year the figure of 19·3 was reached. Since then it has only twice fallen below 16, and only rarely below 18 per 1,000. It is noted that it never fell to this figure once between 1895 and 1905, and it was once (1899) as high as 21·3. The ratios for the last three years (1905, 1906, and 1907) are 20·1, 19·2, and 16·0. The rise in the late '70's has been attributed by Zemanek to the increase of the army during the years of the occupation of Bosnia-Herzegovina, with

the consequent recall to the colours of reservists and men on furlough. On the other hand, as Schweining shrewdly remarks, all experience points to the fact that in the case of troops engaged on active service the incidence of venereal disease is very slight, while, conversely, the cessation of active operations is the inevitable signal for the recrudescence of these ailments. In any case a purely temporary cause like this cannot account for the prolonged and persistent increase of syphilis in the Austro-Hungarian army.

As regards individual army corps, the Seventh has shown constantly the highest ratio for admissions on account of venereal disease. The figures for this corps during the present century are as follows: in 1900, 96·5, and for the years following 98·2, 90·8, 92·8, 99·4, 109·5, 106·6, and 89·2. The proportion of admissions for syphilis to those for all venereal diseases is roughly as 1 to 3. The Seventh Army Corps has its head-quarters in Temesvar in Hungary, and it is noteworthy that the army corps taking the second place on the list is the Fourth, also a Hungarian corps. The Eleventh Army Corps, which stands bracketed with the Fourth, has its head-quarters at Lemberg near the Russian frontier. The corps least affected are the Second, Third, Eighth, and Fourteenth, all of them stationed in the west of the empire with head-quarters at Vienna, Graz, Prag, and Innsbruck. The Fifteenth Army Corps and the military district of Zara on the Adriatic also show figures comparable with these.

During the last ten years the Infantry and *Jägers* of Bosnia-Herzegovina have suffered less than any other units from venereal diseases, the ratio of admissions per 1,000 being only half the average, or even less. The Telegraph Corps also show very low figures, whereas the highest place seems to be competed for between the Fortress Artillery and the Medical Corps. This last-named fact does not encourage one to hope for much good to be obtained from instruction of the men in the dangers resulting from careless sexual intercourse. If any men should know the dangers and consequences of indiscriminate indulgence the men occupied in attendance on the sick should surely do so. The constant object lesson presented to them ought, one would have expected, to be a sufficient warning, but it would seem in the case of the Austro-Hungarian army not to be so.

Some interesting information as to the ethnological distribution of venereal diseases amongst the different nationalities of

which the Austro-Hungarian army is composed, is given in the 'Annual Statistical Reports'. Going back as far as 1899, we find that the race least affected are the Czechs (including the Mähren and Slovaks). Of late years the Slovenians have shown a lower figure than the Czechs, but these are only included in the returns since 1905. The difference is, however, very striking. In the last three years the Slovenian admissions for venereal disease have been in the ratio of rather less than 30 per 1,000, whilst, except in 1899 (30·81), the Czechs have never shown a figure lower than 38. Third in the list come the Croats, about 45 per 1,000, then the Germans, 50 per 1,000, and the Poles with practically the same average. Sixth in order come the Ruthenians with 59, then the Roumanians with 65, and lastly the Magyars with over 70 per 1,000. The Magyars have consistently shown the heaviest ratio of admissions, during the period under discussion, with the exception of 1906, when the Roumanians surpassed them. The interesting point here is the comparatively low figures shown by the Slav races. With the exception of the Ruthenians, who are distinctly worse than the Germans, all the other Slav races are better than the Teutonic; the Poles are, however, on the same level. It is doubtful in how far this order can be considered due to differences in national morality, or to varying racial susceptibility to the diseases in question. The latter seems on the whole more probable. Generally speaking, the ratios given by the Magyars have a decided tendency to fall, while the Czechs and the other allied Slavonic races seem to show a slight though not persistent tendency in the other direction.

As regards the Italian army, figures are available in the *Relazione medico-statistica delle condizioni sanitarie del regio esercito* for 1903, which go back as far as 1884. It will be seen at once that there was a distinct rise in the admissions for syphilis in the years 1889 and 1890, and that that rise has continued up to 1904, the latest year for which I have been able to obtain figures. These statistics refer only to admissions to military hospitals, since it has been impossible to disentangle the admissions for the different forms of venereal disease in the civil hospitals and regimental infirmaries. As regards the different divisions of the army, the heaviest incidence of syphilis occurs in the south. Naples, Salerno, Bari, Catanzaro, Palermo, and Messina all return, in 1903, admission-rates of 26 per 1,000 or over, the average rate for the army being 11·2. Florence and Rome give 14·2 and 18·0 respectively. The northern districts give extremely low figures, the lowest being Genoa, with 4·6

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admissions per 1,000, not much higher, in fact, than the Prussian rate for the same year. The fact of Genoa being a seaport makes this somewhat remarkable. These figures are important, since the high ratio of venereal disease in the Italian army has often been

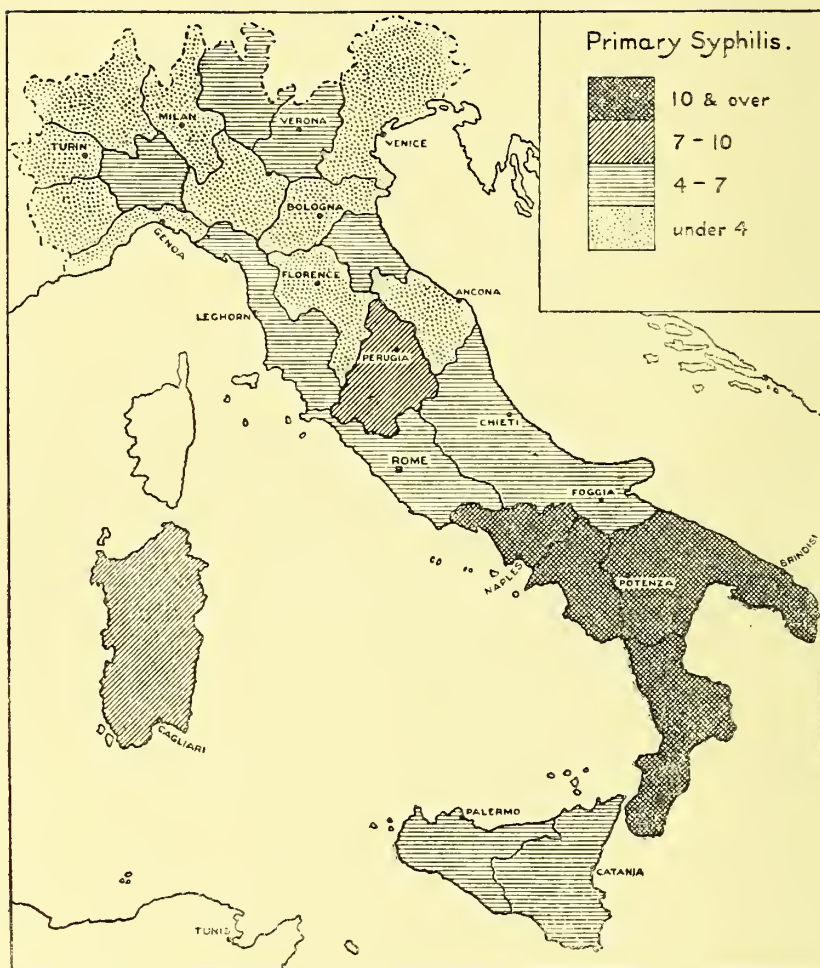


CHART V. Sketch-map of Italy showing the distribution prevalence of primary syphilis in the various army corps for the year 1903.

used as an argument in favour of active preventive measures, which do not obtain in that country. These rates are, however, only partial in their incidence, and regulated to a striking extent by geographical considerations, which of course removes any support in respect of the argument suggested. (See Chart V.)

TABLE VIII

TABLE SHOWING ADMISSIONS PER 1,000 OF STRENGTH ON ACCOUNT
OF SYPHILIS IN CERTAIN EUROPEAN ARMIES

<i>Year.</i>	<i>Germany.</i>	<i>Bavaria.</i>	<i>Year.</i>	<i>France.</i>	<i>Italy.</i>	<i>Austria.</i>
1873-1874	10.0	—	1873	—	—	14.7
1874-1875	8.2	6.7	1874	—	—	10.7
1875-1876	6.4	6.1	1875	—	—	13.3
1876-1877	6.1	6.5	1876	7.4	—	15.2
1877-1878	7.4	7.0	1877	6.6	—	19.3
1878-1879	9.1	10.0	1878	8.6	—	18.0
1879-1880	8.9	10.3	1879	10.2	—	15.2
1880-1881	10.2	9.6	1880	9.5	—	18.7
1881-1882	10.2	12.4	1881	8.6	—	19.4
1882-1883	10.2	12.2	1882	10.8	—	17.6
1883-1884	8.7	11.1	1883	10.1	—	18.4
1884-1885	8.5	8.9	1884	8.5	8.3	19.0
1885-1886	7.4	8.2	1885	8.3	7.2	17.8
1886-1887	6.9	5.9	1886	8.1	6.5	18.0
1887-1888	6.3	6.9	1887	8.3	5.7	17.6
1888-1889	5.9	7.4	1888	8.7	5.9	17.9
1889-1890	5.4	7.4	1889	8.7	8.6	18.6
1890-1891	5.4	6.5	1890	8.8	13.7	15.6
1891-1892	5.9	8.8	1891	7.8	14.0	17.4
1892-1893	7.1	8.8	1892	8.3	14.5	17.4
1893-1894	7.6	10.5	1893	8.4	12.6	18.1
1894-1895	6.8	10.3	1894	7.6	12.3	18.4
1895-1896	5.9	9.7	1895	6.6	12.0	17.8
—	—	—	1896	6.1	13.2	18.1
1897-1898	4.7	4.9	1897	5.5	13.2	17.9
1898-1899	4.4	4.3	1898	5.9	13.3	19.2
1899-1900	4.3	5.0	1899	6.7	13.4	21.3
1900-1901	4.1	4.6	1900	6.3	12.1	18.2
1901-1902	3.6	4.8	1901	6.7	12.5	19.2
1902-1903	4.0	4.3	1902	6.2	13.0	17.9
1903-1904	4.1	3.5	1903	5.9	11.2	19.2
1904-1905	4.4	3.1	1904	—	13.3	19.3
1905-1906	4.5	3.2	1905	—	—	20.1
1906-1907	4.7	3.6	1906	—	—	19.2
1907-1908	—	—	—	—	—	16.0

The seasonal variation of syphilis is somewhat marked, the difference between February, the minimum month, and October, that giving the maximum number of admissions, being as between 1.7 and 3.9 per 1,000. As regards arms of the Service it would appear that the Supply Corps suffers most from venereal disease as a whole, though in respect of syphilis they were in 1903 fractionally surpassed by the *Carabinieri* (*Legioni Territoriali*). The *Alpini* show by far the lowest number of admissions, both for syphilis and for venereal diseases as a class; only 2.7 and 30.7, as compared with 15.6 and 104.0 for the Supply Companies, and 12.2 and 85.1, which forms the general average. The *Bersaglieri*, the Cavalry,

and the Engineers are steadily above the level. The *Relazione medico-statistica* for 1903 attributes the high rates amongst the Engineers and Supply Companies to the fact that the men of these corps come more generally from the operative class and are chiefly city bred, whilst the *Alpini* benefit by drawing on the country and mountain populations. In the same way the Supply Companies are stationed more especially in the large cities, whereas the Engineers are helped by occupying garrison towns for the most part in northern Italy, where venereal diseases are less prevalent amongst the civil population. The *Alpini* not only draw their men from the healthier classes of the population, but live amongst healthier people, and are probably also worked harder.

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The best—as far as I know, in fact, the only—publication giving a study of venereal diseases generally amongst the armies of Europe is the *Beiträge zur Kenntniss der Verbreitung der venerischen Krankheiten in den europäischen Heeren sowie in der militärpflichtigen Jugend Deutschlands*, by Dr. Heinrich Schweining, *Stabsarzt und Hülfsreferent* in the medical division of the German War Office, which forms vol. xxxii of the *Veröffentlichungen auf dem Gebiete des Militär-Sanitätswesens* issued officially. For my account of the Prussian-German army I have been indebted almost entirely to this excellent brochure, though the figures have been completed from the official annual report.

The remaining sources of information are the Annual Reports issued by the medical departments of each army as follows :—

French. *Statistique médicale de l'Armée*. Paris, *Imprimerie Nationale*.

German. *Sanitäts-Bericht über die Königlich Preussische Armee, das XII. und XIX. (1. und 2. Königlich Sächsische) und das XIV. (Königlich Württembergische) Armeekorps*. Berlin, Mittler und Sohn.

Austrian. *Statistik der Sanitätsverhältnisse der Mannschaften des k. und k. Heeres*. Vienna, *Kaiserlich-Königliche Hof- und Staatsdruckerei*.

Italian. *Relazione medico-statistica delle condizioni sanitarie del regio esercito, compilata dall' Ispettorato di Sanità Militare (Ufficio Statistico)*. Rome, *Tipografia Cooperativa Sociale*.

In addition to the above, statistics by themselves may be found in the Supplement to the Annual Report now issued by all civilized armies in accordance with the forms agreed upon by the International Military Sanitary Statistical Conference held at Buda-Pesth in 1894. The first issue is dated 1903.

CHAPTER VI

PRINCIPLES OF PREVENTION. EARLY NOTICES

THE prevention of venereal disease has always attracted considerable attention from military administrators. This could hardly be otherwise in view of the great effect these diseases have on the efficiency of troops in time of peace, and on the number of men rendered ineffective from this cause on mobilization. To take an extreme case, the British army in India, in the year 1896,¹ had 36,681 men admitted to hospital for all venereal diseases, of whom 18,116 suffered from syphilis, while at any one moment 3,162 were actually under treatment for those diseases, and 1,760 for the more serious form of infection. No man who has contracted syphilis within the year can be considered fit for active service, and supposing that every man suffering from syphilis were admitted twice during the first twelve months, a force equivalent to nine battalions on war strength—more, that is, than two brigades—was in the year named unfit to go to the front in India if required. On the other hand, in the German and Bavarian armies, taken together,² on the same method of calculation, only one battalion and a half were similarly incapacitated, though of course the total strength of these last-named armies was enormously greater. The efficiency for war, therefore, of the German army and of the British army in India was, relatively, enormously and disproportionately affected by the incidence of this disease. From a purely military point of view, therefore, it is obvious that almost any steps would be justified which had for their object the prevention of this terrible cause of inefficiency. The case is made even stronger when we reflect that syphilis is of all constitutional infective diseases the one disease which is contracted under circumstances absolutely under the control of the individual. *Syphilis insontium* is not a common form of the disease, and practically every man who contracts syphilis may be said to do so by his own fault. Exposure, hard work, the privations incidental to military service, may expose a man to the risk of contracting enteric fever, cholera, or malaria, but if a man become infected with syphilis he does so because either

from want of self-control or from carelessness he has wilfully exposed himself to the contagion. Prevention then seems to be obviously more simple in theory, and should, it might be anticipated, be more effectual in practice in the case of syphilis and other venereal diseases than in the case of any of the other more generally recognized infectious complaints. This should hold good from a military even more than from a civilian point of view, since the conduct and life of the soldier are far more under control than that of the ordinary man in the street. A history of syphilis in armies would therefore be incomplete if it lacked reference to the various attempts that have been made towards the prevention of this disease, and to the results of these efforts and to the general principles on which these are based.

As in the case of all other infectious diseases, prevention must aim either at preventing contact of the non-infected with the infected individual, or, assuming such to have occurred, or to be unavoidable, at preventing the infection having any dangerous results. When we consider the prevention of venereal diseases we must then first try to prevent the soldier indulging in fornication. This may be done in two ways. Either we must train his moral sense to such a pitch that he will live in chastity, or else we must fill his time so completely with work, and preferably with hard physical work, that he shall have neither leisure nor inclination for indulging in promiscuous sexual intercourse. Naturally these two measures can be combined, and since fornication demands the expenditure of certain moneys, the safety of the soldier will be further ensured by reducing his spare cash to as low a level as possible—that is, by paying him a scanty wage. Hard work, small pay, and a minimum of leisure, are probably the most efficacious methods, yet devised, of preventing venereal disease. To these the low rates of admission for syphilis in the German and other Continental armies are undoubtedly due. It must be noted, however, that these conditions are compatible only with a compulsory term of service. Voluntary enlistment and such restrictions can hardly co-exist. Under such a system we must rely, speaking now only of the prevention of fornication, on educating the soldier's moral sense, and affording him inducements of a social nature which shall lead him to avoid contaminating society.

It may, however, be objected that no man of the age to which the soldier belongs, the young male adult that is, can be expected to live in absolute chastity, and indeed such an objection is commonly made. Some will even go further, and say that such

a life is unhealthy on physiological grounds. To these last it may be at once replied that it has been done; young men have repeatedly abstained from promiscuous intercourse, not only as individuals but as members of a class or sect, and been none the worse for it. The old quotation from Tacitus referring to our Teutonic ancestors, *Sera iuvenum Venus, ideoque inexhausta pubertas*, is here very much to the point. While, therefore, refusing to accept this last argument, it is only reasonable to admit that though individuals, even a large number of individuals, may on personal grounds of self-respect, or morality, preserve their chastity, it is too much to hope that out of a large collection of young male adults, living the communal life of the barrack-room, all shall attain to that high ideal.

As a matter of practical politics we must therefore recognize the inevitability (not by any means the necessity) of a certain amount of fornication, and if we desire to prevent infection resulting we must proceed in precisely the same manner as we would proceed in the case of an occupation of any sort which exposed the men engaged in it to infection of any other kind. There is one ruling principle that governs all such preventive measures, and that is the segregation of all infected persons until the disappearance of the disease. To segregate only one-half the number, or to select individuals on account of their sex for preferential treatment, would be recognized, in the case of a disease such as small-pox or scarlet fever, as being just as reasonable as to select them on account of the colour of their hair or their religious belief. Scientifically, any such system would stand condemned, and from the point of view of the administrator or politician it is equally objectionable. All repressive measures are expensive and unpopular; the money is wasted, and the unpopularity increased, when the measures are only partial in their incidence and designedly applied only to a certain class. To this point I will return later when discussing the actual effects observed as a result of the application of repressive measures, principally in Great Britain.

One last method of prevention is applicable only to venereal diseases. This consists in mechanically preventing actual contact of the genital organs of the male and female during the act of coition, a procedure common as an individual precaution, and administratively encouraged in certain services. We may couple with these measures the use of disinfectant lotions for ablution or injection after connexion, a step also commonly in use, and similarly recommended to the soldier in some armies. I propose

to discuss the above methods historically, and also with reference to their epidemiological and ethical bearing.

The history of prevention of venereal diseases goes back, as might be expected, to a date much anterior to that of the first appearance of syphilis in Europe. References to such measures may be found in the works of Proksch.^{3,4} As regards syphilis, however, the first notices are to be found in the earliest writers on the subject, Torella⁵ and Diaz de Isla⁶, both of whom were in favour of State interference. The earlier attempts at prevention were, in fact, on the lines that all such measures take in the case of ordinary infectious diseases, viz. the isolation and detention of the actual sufferers, with penalties attached to recusancy, varying with the humour and temper of the age. It would be impossible to detail all the different recommendations put forward by various social reformers for the control of disease or of prostitution. A few, chosen more or less at random, may be given. Proksch⁷ refers to a suggestion made in the eighteenth century by two medical men, by name Hoffmann and Chauvet, to the effect that mercury pills (*Pilulae Maiores Hoffmannii*) should be made publicly available, the fact being notified in the daily periodicals, on payment to those able to pay, and free to the poorer classes. They consider that cure, in this manner, would be made so certain that the expense entailed would be well justified. Proksch is rather inclined to throw ridicule on the proposal, but it is to be noted that modern ideas are now coming round to the same point. Easily accessible treatment, and the recognition by the general public of the necessity of early treatment, are probably among the best methods of reducing the prevalence of venereal diseases, including syphilis. Less practical, but more original, is the suggestion of Jourdan le Comité.⁸ He begins by recognizing the necessity of a celibate army, and suggests that to redress the balance prostitutes should be distributed to the various garrison towns, about 300 being allotted to each. Men were to be allowed access to these women freely, but with certain restrictions as to time, to prevent trouble and disturbance. 'Would it not be possible,' the author proceeds, 'to grant the entrée as an agreeable recompense permitted only to those who performed their duties with the greatest care and efficiency?' If by any chance children should be born as the result of these unions, under the circumstances neither illicit nor irregular, the children should be reared to follow the professions of their parents, according to the limitations imposed on them by their sex. In general these earlier measures were directed,

and with some severity, against the women only. Of such is the pre-syphilitic regulation of Henry V, that 'no man shall keep a harlot in his quarters upon pain of losing a month's pay; and if any man can find any common woman or women in these quarters my lord commands him to take from her or from them the money found on her or them, and to take a staff and drive her out of the army and break her arm'. In the articles and ordinances of war printed at Edinburgh in 1643 it is laid down that 'if any common women shall be found following the army, if they be married women and run away from their husbands, they shall be put to death without mercy, and if they be unmarried, they shall first be marked by the hangman, and thereafter by him scourged out of the camp'.⁹ Sir George Ballingall relates an equally drastic step, though less brutal in its execution, adopted by the officer commanding the Royals when in India. It is interesting to think that the incident cannot be much more than 100 years old. 'The regiment being overrun with venereal disease and upwards of sixty men off duty from this cause, the commanding officer determined on adopting the most summary means for its suppression. With this view he, without any previous warning, sent a patrol round the barracks in the middle of the night, to take up every unmarried woman who should be found there. They were all confined in the congee-house, or black hole, until the following morning, when they were inspected by the native doctors attached to the regiment. Such of them as were free from disease were furnished with written passports, giving them free access to the barracks at all times; those who were found diseased were drummed out of the fort, after having their heads shaved and whitewashed, a mark of disgrace which was for a time indelible and was a sufficient beacon to cause them to be shunned.'¹⁰ Other instances of brutality of this nature could be cited from other writers on military occurrences in the Georgian Age, but it is unnecessary to multiply instances. Prevention of venereal diseases in these times was a haphazard affair, conducted or omitted at the caprice of the commanding officer. Systematic prevention dates, in our army, only from the year 1862 and the passing of the first Contagious Diseases Act.

Personal prophylaxis is also of old standing. A certain Dr. Conton of London, in the time of Charles II, is generally credited with the invention of mechanical means for preventing contact of the male and female generative organs during connexion, in the form of the appliances called after him Condoms, or more vulgarly 'French Letters', or *Capotes anglaises*. Sir

William Forsyth, a military surgeon belonging to the Guards, recommended in the year 1767¹¹ the use of inunctions of mercurial oil prior to connexion, as follows : ‘ *Forsan hydrargyrum in oleo animali vel vegetabili cocto solutum, et virgae ante coitum bene inunctum ad prophylaxin propinquat.*’

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CHAPTER VII

HISTORY OF PREVENTIVE MEASURES IN THE BRITISH ARMY

SYSTEMATIC prevention in this country dates from the appointment of a joint committee by the Admiralty and War Office in the year 1862 to inquire into the prevalence of venereal disease in the army and navy. The report of this committee was published on December 15, 1862, and is a most important document. The following extracts sufficiently illustrate its bearing and scope :

‘ It appears to your Committee that there are two courses open to the Government in dealing with this great evil. One is the adoption of some system analogous to that which exists in many European countries, and in some of our own dependencies, for the compulsory registration and periodical examination of all prostitutes. This would require legislation. The alternative course is, without any attempt at coercion, to induce prostitutes of our garrison and seaport towns to come voluntarily into Lock Hospitals when diseased, and even to submit to periodical medical inspection. The former or coercive course has been strongly urged on your Committee by many who have had opportunity for observing the fearful extent and evil consequences of venereal disease in our military and naval hospitals. Your Committee, however, have not found in the Reports from foreign countries where this system is practised, such conclusive and consistent evidence of the diminution of the disease by coercive measures as to lead them, particularly while the other course remains untried, to recommend for adoption in this country a system involving new and questionable principles of legislation, and certain to be distasteful to a large portion of the public.’ The report then points out that in various foreign countries the ratios for venereal disease vary very much, and continues, ‘ These striking inequalities show how unsafe it would be to found conclusions on figures alone, without more intimate knowledge of the working of systems and the special circumstances under which they are put in force, than your Committee possess. The probability is that any system of medical inspection, if enforced against the wish of the women, would prove delusive.’ The Committee consider that the attention of the local authorities of garrison and seaport towns should be drawn to the ‘ disgraceful and alarming ’ amount of prostitution within their jurisdictions. ‘ It might even be well that they should be warned that if they do not put into force the powers for the repression of this evil which the law has put into their hands, it will be necessary for the Government to take other steps for remedying it.’ Attention is also drawn to public-houses ‘ little more than brothels in disguise ’.

The committee further recommend punishment of soldiers for

concealment of disease, but not for merely contracting it, and also the provision of increased facilities for ablution. The report concludes with the following words :—

‘ Your Committee have refrained from entering into the painful details which have come to their knowledge of the state of our Military and Naval stations at home as regards prostitution. These facts are so appalling that they feel it a duty to press on the Government the necessity of at once grappling with the mass of vice, filth, and disease, which surrounds the soldier’s barracks and the seaman’s home, which not only crowds our hospitals with sick, weakens the roll of our effectives, and swells the list of our invalids, but which surely, however slowly, saps the vigour of our soldiers and our seamen, sows the seeds of degradation and degeneracy, and causes an amount of suffering difficult to over-estimate.’

A dissentient minute was signed by J. Liddell, who states that the Report ‘ in my opinion does not touch on the arrest of the disease at its source ’ and has ‘ no hope that if all the recommendations of the Report are carried out that diminution of syphilis will be effected, and the regulations themselves will soon fall into desuetude, like all former similar measures. It appears to me, therefore, that the only sure means of limiting the ravages of syphilis and probably of causing its entire disappearance, are to superintend the health of those public women who propagate it by compulsory examination and cure. All the Army and Navy reports from Commanding and Medical Officers are in favour of this measure. Some express doubts of its practicability, but never of its importance and value.’

As a result of this inquiry the first of the Contagious Diseases Acts was passed, that, namely, of 1864, the main provisions of which were as follows : At certain places named in the schedule of the Act, on an information laid before a justice of the peace by a superintendent or inspector of police, or by any registered medical practitioner, stating that the informant ‘ has good cause to believe ’ that ‘ a certain woman ’ is a common prostitute and has a contagious disease, and within fourteen days before the date of the information ‘ was in a public place within the limits of a place to which the Act applies for the purposes of prostitution ’, the justice might call upon that woman to appear to answer the charge, and, ‘ on oath being made before him substantiating the matter of the information to his satisfaction, order such woman to be taken to a certified hospital for medical examination.’ The result of this examination was to be reported to the justice, and if the woman were found to be suffering from contagious disease the justice could issue an order for the detention of the woman for a period not exceeding three months.

The places to which the Act was made applicable were Portsmouth, Plymouth and Devonport, Woolwich, Chatham, Sheerness, Aldershot, Colchester, Shorncliffe, the Curragh, Cork, and Queenstown. The limits of these places were laid down with some liberality, Aldershot extending, for instance, as far as Pir-

bright, and even Eversley. This Act had hardly been passed when a committee of eminent medical men was appointed to investigate its working. The date of this committee is October 1864. It consisted of six civilians (Skey, Babington, Cock, Donnett, Richard Quain, and Samuel Wilks) and one army medical officer, Dr. T. Graham Balfour, appointed by the Secretary of State for War and the First Lord of the Admiralty for the above purpose. Their report may be summarized as follows :—

Success of Contagious Diseases Prevention Act. ‘The evidence shows that in one most important point this Act has been successful, and in just that particular in which it might, *a priori*, have been expected to fail, viz. that which relates to the feelings of the unfortunate women with whom it has to deal ; so far from opposing its operation they appear to appreciate its value to themselves.’ Magisterial interference in its operation had been the exception. ‘Out of 752 informations laid, all the women attended voluntarily but six ; and there is evidence to show that they would be tolerant of even further interference, having their health for its object.’

Defects of Act. Out of sixty witnesses forty-two thought that the Act did not go far enough, or offered opinions upon the directions in which its powers should be increased. The committee thought that the points on which the Act was most defective were, (1) the evidence on which the information was laid was bad of its kind ; (2) that when furnished by the man it was, if trustworthy, too late ; (3) that in some places the Act works with difficulty and is slow of operation ; (4) and mainly that it does not enable the authorities to lay their hands on the disease and eradicate it in its earliest stages, when it is most easily susceptible of cure. The committee argued from this last to the necessity for periodical examination of all prostitutes, and their detention when diseased till cured. They supported this opinion by the evidence of Major-General Sir James Storks, Governor of Malta, and other witnesses who testified to the good effected by reduction in amount of venereal disease as a result of the Act. The committee also recommended periodical examination of the men, supporting themselves on the testimony furnished by the Duke of Cambridge, Sir Richard Airey, Sir Henry Storks, and others. The Director-General of the Army Medical Department opposed this suggestion, mainly on grounds of sentiment. Increased facilities for ablution were recommended, and also steps to improve the moral and physical condition of the soldier. Dr. Graham Balfour, the only representative of the military

medical profession on the committee, and at that time statistical officer of the Army Medical Department, dissented (1) from the periodical examination of prostitutes. He considered that this could only be done through a system of registration as adopted in France, and that it would involve the legislative recognition of prostitution as a branch of industry. He did not consider that any improvement in the moral character of the women subjected to examination was to be expected. (2) From the periodical examination of the men. He thought that this would be destructive to their self-respect, and that punishment for the concealment of disease would be equally efficacious. He thought, too, that it would have a deterrent effect on re-engagement. He pointed out that this examination had been abolished in 1859 on the recommendation of Lord Herbert's Committee, on account of its great unpopularity with medical officers. On the other hand, he did not think that either officers or men would object to an examination made on all occasions of a man going on or returning from furlough. His recommendations go chiefly in the direction of increasing the powers of the police, and the surgeons of Lock Hospitals.

In 1866 the Act of 1864 was repealed, and a new Act introduced which laid down that 'where an information on oath is laid before a justice of the peace by a superintendent of police, charging to the effect that he has good reason to believe that a woman therein named is a common prostitute, and is either resident within the limits of any place to which this Act applies, or being resident within five miles of those limits, has, within fourteen days before the laying of the information, been within those limits for the purposes of prostitution', the justice shall issue a notice calling on such woman to appear at a time and place laid down in the notice. If the woman appeared, in person or by proxy, or if she failed to appear (proof being given that the notice was served on her in due time to enable her to do so), the justice, if he thought the charge substantiated, was empowered to order 'that the woman be subject to a periodical medical examination for any period not exceeding one year, for the purpose of ascertaining, at the time of each such examination, whether she is affected with a contagious disease.' The difference between these two Acts is sufficiently remarkable. By the first Act the woman had to be suspected of being not only a prostitute but also diseased; by the second the mere fact of being suspected of being a prostitute was sufficient to justify her examination, which is tantamount to a presumption of disease. This involves

an obvious injustice when the relative treatment meted out to women and men by all Contagious Diseases Acts is remembered. Provision was also made for the institution of 'certified hospitals', the appointment of visiting surgeons and inspectors of hospitals, the details of these arrangements being left to be carried out by the Admiralty and War Office. The stations selected were the same as those mentioned above, with the addition of Windsor.

The next step to be noted was the appointment in May 1868 of a Select Committee of the House of Lords to inquire into the working of the Act of 1866.

The committee confined their report to three points:—

1. As to the results of the Act. The Act of 1866 was brought in to supplement that of 1864. At the time of the report the Act had only been fully tested at Sheerness, and in principle at Malta and in the Ionian Islands under Sir J. Storks. 'At Aldershot the amended Act has been fully carried out for only two months, and already the decrease of cases among the troops has been nearly one-third. At Devonport, in April 1865, out of 8,583 soldiers and sailors 180 were admitted to hospital, while in April 1868, out of 10,635 men, only 69 required admission.' At Sheerness, previously one of the most infected places, 'the disease is now almost obliterated, only two women having been reported as diseased in one month and not one man during another.' Disease had not only been less in amount, but was also milder in character. 'It has been stated in evidence that the surveillance and examination imposed by the Act has tended to deter women from prostitution, and that, when committed to hospital, the time for reflection, the religious instruction under which they have been brought, and the kindness with which they are treated, have led many to abandon their evil course of life.' The chief witness on this, the moral effect, side of the question was the Rev. Joseph Bailey, the chaplain of St. Bartholomew's Hospital at Chatham. He stated that 23 per cent. of the women admitted in the course of eighteen months had been induced to forsake prostitution. He says (Question 897), 'We have had several meetings at Chatham, and I think, taking all the clergy in Rochester and Chatham, only two held a different opinion, and they merely declined to further the extension of the Act; they did not oppose it; but the great majority are in favour of extending it.'

2. As to the practicability of extending the operation of the Act. The beneficial effects of the Act had been impeded by the introduction of fresh cases of disease by women coming from places beyond the area of those districts. 'It is therefore obvious that the benefits of the Act will be greatly increased as its operation is extended.' 'It is gratifying to find that in no case has any objection been made to the Act in places to which it has been applied, while meetings which have been held in many important towns, such as Newcastle, Cheltenham, Gloucester, Exeter, Liverpool, Reading, and Bath, indicate a disposition on the part of the inhabitants favourable to its introduction.'

3. As to the measures the committee recommend to be adopted in order to gradually extend the Act of 1866. 'All the witnesses examined before the committee are agreed as to the practicability and actual necessity of extending the Act, but all recommend great caution in doing so. In any large extension of this Act special care must be taken that equal tact and supervision is exercised by those selected to carry it out.' The working of the Act had been under

the Metropolitan Police, who had executed their duties with so much tact that the women voluntarily submitted to the requisite measures, recourse to a magistrate's order being almost unknown. Mr. F. M. Mallalieu, Inspecting Officer of the Metropolitan Police appointed for Her Majesty's Naval and Military Stations, stated (Answer 127), 'We have had through our hands 5,479 women, and out of that whole number we have only had occasion to employ the penal clauses of the Act in six cases.'

They further recommended that power should be given by Order of Council 'to apply the Act of 1866, first to all naval and military stations, and secondly to any locality the inhabitants of which may apply to be included in the operation of the Act, and be able to submit satisfactory proof on the following points, viz. that adequate hospital accommodation can be provided and maintained; that the necessary arrangements can be made for the religious and moral care of the inmates of such hospital or ward, according to the provisions of this Act, and that the police force is efficient.' In 1869 a Select Committee of the House of Commons was appointed to inquire into the working of the Act of 1866.

The investigations of this committee were confined to—

1. The operation of the Act in those districts to which it had been already applied. On this point they report that 'Although the Act has only been in operation two years and a half, and at some stations only seven months, strong testimony is borne to the benefits, both from a moral and a sanitary point of view, which have already resulted from it. Prostitution seems to have diminished, its worst features have been softened, and its physical evils abated.'

2. The alterations which may be necessary to procure more satisfactory results. The report touches on certain defects in the Acts. The limit of five miles seems to be insufficient, women residing outside this limit to avoid the Act. Recommended that limit be extended to fifteen miles. Sufficient power not given by 17th section to ensure continued obedience to requirements of 19th section of women who submit themselves voluntarily. Recommended that a visiting surgeon's notice have in future the effect of a warrant. Power should be given to the visiting surgeon to order the detention of women who are not in a condition to be examined when they present themselves, but with regard to whom there is suspicion that they are diseased. Period of possible detention to be extended from six to nine months. Certificates of discharge sometimes improperly used and often change hands. Recommended that in future these be kept in hands of police. In view of the fact that, out of 700 women of ill fame in Devonport, in the first four months of the year (1869) 41 were undoubtedly restored to a virtuous life by the direct and indirect influence of this Act, and 29 more left the district, it was recommended that in future a woman wishing to be discharged from attendance at the hospital might apply for discharge to the visiting surgeon instead of to the magistrate. The surgeon's order of discharge to be equivalent to that of a magistrate. Recommended that in the case of pregnant women, if the birth of the child seemed likely to occur during the period of detention in hospital, arrangements should be made to facilitate confinement in the hospital, instead of the woman being discharged, as at present the case. Recommended

that legislative provision should be made for sending to an industrial school or other suitable institution such children as had been permitted to become prostitutes at the instigation or with the connivance of their parents, and had become diseased. As regards the periodical examination of soldiers 'it appears not unreasonable that, for the general good of the Service, other soldiers (i. e. other than married men of good character or N.C.O.'s) should be periodically examined, and your Committee have reason to suppose that such a system would not prejudice the Service.' Recommended that special legislation be undertaken to prevent women being brought from considerable distances by tramps who live on these women's earnings, this applying especially to Aldershot, though possibly at other camps also.

3. Recommended that in addition to the power of extending the operation of the Act to a radius of fifteen miles, the following places be added to those in existing Act, viz. Gravesend, Maidstone, Winchester, Dover, Walmer and Deal, and Canterbury.

This committee shirked the question of the extension of the Act to the civil population generally, but suggested that this question should be considered by a committee early in the next session.

This course does not seem to have been adopted, but in pursuance of the recommendations of the two select committees already referred to, a fresh Act was introduced in 1869, enlarging some of the provisions of the Act of 1866 and extending its operation. The number of places affected by the Act was increased by the addition of Canterbury, Dover, Gravesend, Maidstone, Southampton, and Winchester, and instead of the five-mile limit of the Act of 1866, one of ten miles was fixed. The provisions of the Act were made applicable to any woman 'who, being resident within ten miles of these limits, or having no settled place of abode, has within fourteen days before the laying of the information, either been within those limits for the purpose of prostitution, or been outside of those limits for the purpose of prostitution in the company of men resident within those limits'. For some years these measures attracted but little attention. The Act of 1864 was allowed to pass as a partial measure of sanitary police, for the benefit of soldiers and sailors of the army and navy. The Act of 1866 was little heeded, amid the party strife and the agitation of questions of the highest political importance which marked that year. The Act of 1869, which amended and extended the Act of 1866, also passed without opposition. When the hospital and police arrangements were completed, at the commencement of 1870, the public women in all the protected districts were required to appear, and the examinations, which had hitherto irregularly taken place at periods varying from three months to three weeks, were now enforced upon every prostitute once a fortnight. About the same time an association comprising many

persons of eminence and authority was organized for the purpose of extending the Acts beyond their existing limits ; and branch societies were formed in many large towns to promote such extension. These proceedings had a considerable effect on the public mind. In July 1868 the Lords had reported that in no case had any objection been made to the Act in places to which it had been applied, while meetings had been held in many important towns not subject to its operation, favourable to its introduction. But before the end of the following year a formidable opposition had arisen. An active and influential organization was arrayed against the Act. Public meetings were held in most of the subjected districts and in several large towns, at many of which meetings inflammatory statements were made as to the character and operation of the new law. Most of these statements, so far as they had any foundation whatever, were perversions of the truth ; but they had their effect. Nevertheless, the movement against the Acts was supported by many persons of station and intelligence, and among others by several ladies, who resented the legislation as insulting to their sex, and tending to the depravation of public morals. In the midst of this agitation the House of Commons was moved to repeal the Acts, and after a long discussion with closed doors, it was decided to refer the whole question to a Royal Commission to inquire into and report upon the administration and operation of the Contagious Diseases Acts (1866 to 1869), with power to suggest whether the same should be amended, maintained, extended, or repealed. A Royal Commission was appointed as therein recommended in the year 1870, one of the members of which was Thomas Huxley. The report of this commission was furnished in the year 1870, and is summarized by them as follows :—

‘ To sum up : we recommend—

1. That the periodical examination of public women be discontinued.
2. That every common prostitute found to be diseased after an examination by a medical officer upon a voluntary submission, or upon a magistrate’s order, shall be detained in a certified hospital until she is discharged by a magistrate’s order, or by the authorities of such hospital ; provided that the detention shall in no case exceed three months.
3. That every keeper of a public-house harbouring prostitutes be deprived of his licence.
4. That every keeper of a common lodging-house harbouring prostitutes be subject to the penal clauses of the Common Lodging-Houses Acts.’

The age of consent to carnal intercourse was raised to 14 years from 12 as laid down in the Act (24 and 25 Vict.) to consolidate

and amend the law relating to offences against the person. In addition it was recommended that all girls under 16 acting as common prostitutes be sent to a home or industrial school for two years, if they cannot be otherwise provided for to the satisfaction of the magistrate. The concluding paragraph of the report is of considerable importance. It points out that the law, if amended as suggested, should not be given the same title as the earlier Acts.

‘We do not recommend,’ it runs, ‘legislation merely for the better prevention of contagious diseases at certain naval and military stations. We do not recommend special legislation for the purpose of protecting from the consequences of vicious indulgence any class of your Majesty’s servants. But we do think for the public good, particular districts which are, from any cause, peculiarly liable to contagious disease, should be subjected to special sanitary regulations. We therefore approve of the establishment of hospitals at the public charge, and of police regulations enforced under central authority within such districts. Having regard, however, to the general prevalence of the disease, and its effects on the health and happiness of the innocent as well as the guilty, we are of opinion that such regulations should form part of a general measure comprising various amendments of the law. The measure which we recommend includes provisions which, if adopted and strictly maintained, would, we believe, contribute largely to the prevention of the disease, but would be very inaccurately described by the title of the existing Act.’

The above collection of lofty sentiments is merely the expression of a hope that a Contagious Diseases Act under some other name (what other name is not stated) would smell less vilely in the noses of certain upsetting persons. The only recommendations of real value are those referring to public-house and lodging-house keepers guilty of harbouring prostitutes and the increase of the age of consent, which last does not, however, go far enough. It is doubtful if a girl of fourteen, even of the lowest class, knows much more of the significance of carnal connexion than a girl of twelve. As regards the discontinuance of periodical examination, that step was undoubtedly retrograde. There can be no question that if women are to be submitted to enforced examination at all, then it is better to make that examination a periodical affair and a matter of course. Either examination is right or wrong. If it is right, then it should be made as wide-spreading as possible; if it is wrong, then it should be stopped altogether. Inefficient examination only aggravates the wrong, if that exists, or, on the other hand, does away with any good that may possibly result from its enforcement. Bishop Blougram stated the position once for all in doubtful cases of this kind:

‘If once we choose belief, on all accounts
We can’t be too exclusive in our faith.’

The Royal Commission of 1870, in giving way on the question of periodical examination, in reality yielded the entire position, and it would have been more logical to realize this at once and abolish examination altogether.

An important minority, amongst whom were Lord Hardinge, Samuel Wilks, and T. Holmes, signed a dissenting minute, in which they pointed out that great good had resulted from the enforcement of the Acts, chiefly in clearing the streets of prostitutes, reducing prostitution generally, both open and clandestine, especially juvenile prostitution, and in bringing abandoned women often for the first time within reach of religious and moral influences. They saw no adequate reason why they should 'yield to a clamour which we do not believe to be well founded or deep seated, which we believe to have been, for the most part, artificially excited by means, the discreditable character of which has been stigmatized with just severity in the foregoing pages, and which we may reasonably hope will be silenced by the force of facts'. In fine, with some alterations of detail, they thought that so far from anything in the form of repeal, the Acts should be gradually and cautiously extended as circumstances might render possible and advisable. Other minutes of dissent, chiefly in a sense opposed to the above, were also, but less strongly, supported.

Meanwhile the opposition to the Acts in any shape or form persisted, and increased in strength. Towards the end of the '60's a society was formed called the National Association for the Repeal of the Contagious Diseases Acts, and in March 1870 a journal named 'The Shield' was issued, as the official organ of the Association. For many years this paper worked at its object, collecting diligently all cases of hardship inflicted on women by the police regulations of places under the Act, and assisting even in opposition to the election as Members of Parliament of men known to be strong supporters of the Acts. The most prominent case of this kind was that of Sir Henry Storks, who was defeated in a contest at Colchester in November 1870, chiefly owing to the exertions of the Association. The growing opposition and discontent bore the usual fruit in the shape of a Select Committee of the House of Commons, appointed in June 1879, 'to inquire into the Contagious Diseases Acts, 1866-9, their Administration, Operation, and Effect.' This committee, after an inquiry which extended, as they themselves say, 'over a period almost unprecedented in the history of parliamentary committees,' presented their report in August 1882. After a brief

review of the previous history of the subject and of the reports of earlier committees, and of the Royal Commission of 1870, the committee proceed to consider the hygienic aspect of the question. They made a careful comparison, for this purpose, of the statistics furnished from fourteen subjected stations and fourteen not subjected stations, also between the former and all unsubjected stations, and on the basis of these they concluded that 'The extent to which the Acts have diminished primary and constitutional syphilis in the subjected districts appears of itself, to your Committee, to establish the hygienic utility of the Acts. The diminution of gonorrhoea in the subjected districts, attributable to the Act, in the same period is less considerable but substantial.' Passing next to the constitutional, moral, and social effects of the Acts, the committee considered in detail the chief objections urged against the continuance of the Acts. These were that they involved the State recognition of vice, that they violated the first principles of constitutional law, that they increased vice by affording impunity, that they subjected women to restraints from which men were free, that they subjected virtuous women to the risk of police persecution, and, lastly, that they increased clandestine prostitution. On the first point they considered that the passing of the Acts did not involve the State recognition of prostitution to any greater extent than the fact that the State openly permitted prostitutes to practise their trade publicly, so long as they did so in an orderly manner. On the second they point out that the constitutional position was the same as in the case of the law enforcing vaccination, or isolation of people suffering from infectious complaints. As regards the third, they point out that the safety conferred is alleged by the same people who state that the Acts are a failure. With reference to the fourth objection they point out that the Acts are not aimed at women as a class, but at prostitutes only; and on the fifth point they state emphatically that, as a matter of fact, no case of such persecution had been proved. They repeat the opinion on this subject of the Royal Commission, 'That the police are not chargeable with any abuse of their authority, and that they have discharged a novel and difficult duty with moderation and caution.' The last objection they also dismissed. Turning now to the advantages urged by the supporters of the Acts, they found that in the subjected districts both brothels and prostitutes had decreased, that juvenile prostitution in especial had been greatly diminished, that the physical condition of the women had been improved, and that public order and decency had been promoted by the

operation of the Acts. They felt supported in this opinion as to the beneficial effect of the Acts by the strong feeling in their favour at the subjected stations.

They reported therefore against the repeal of the Acts. At the same time they did not recommend their extension, in view of the hostility felt, largely on religious grounds, by many people against the Acts. They recognize the want of logic in their position, but defend it on grounds of expediency. They recommended the continuance of the existing methods of supervision and registration, and also of periodical and compulsory examination, and of compulsory detention in hospital. A draft report submitted by Mr. Stansfield, as an amendment to the chairman's draft report, was negatived by eight votes to six. This draft report traversed the report as eventually agreed to in most conclusions arrived at. It will be seen, therefore, that the committee was fairly equally divided as to the advisability of continuing or repealing the Acts. This fact could not do otherwise than strengthen the hands of the opponents of the Acts, and in fact within nine months of the issue of the report a recommendation of the minority as to the compulsory examination of women was adopted, and an order passed abolishing this procedure. This was obviously only a step towards complete repeal, which followed in 1886 in the Contagious Diseases Repeal Act. Since then there has been no revival of the system, and at the present day few things are more unthinkable than such a contingency.

Preventive measures of a personal nature have never been recognized in the British Army. The regulation of syphilis (and of venereal diseases in general) is limited to a carefully systematized method of treatment, and is described in detail in that portion of this volume which deals with that part of the subject.

CHAPTER VIII

HISTORY OF PREVENTIVE MEASURES IN OTHER ARMIES

THE ordinary practice amongst Continental nations has been, and is, to register and examine all women known to be prostitutes. The examination is usually carried out once a week, by specially appointed medical men. Details differ in various countries, but the general principles are those of our Act of 1869. Italy is the only country which follows our example and has no regulations for the control of prostitutes. Venereal inspections of the men are the general rule, and any man admitted to hospital suffering from venereal disease is asked to identify the woman from whom he contracted his infection. This process is acknowledged, in France at least, not to be invariably successful, as indeed is the experience in our own army on the occasions on which it has been tried. In Germany a law exists making it compulsory on any civilian doctor treating a soldier for venereal disease to notify the same to the military authorities. The object of this measure was to discourage the practice, rather common amongst the men, of going for medical treatment outside of barracks with a view to concealing their condition. Unfortunately, like so many regulations of this nature, it has had an effect the opposite of that which was intended, and soldiers, instead of, as formerly, going to respectable medical practitioners, now resort to the advice of ignorant quacks, with the natural result that they have eventually to be admitted to hospital with the disease in a much aggravated form. In Sweden and Denmark, in addition to the usual registration and examination, gratuitous treatment is afforded for any person suffering from venereal disease. Much difficulty is found in all armies in dealing with clandestine prostitution. In the Annual Medical Report of the French Army, in particular, this complaint is made again and again.

In 1902 a ministerial circular was issued to the French army relative to the prevention of venereal diseases. This circular enjoined on medical officers the duty of warning their men, both individually and collectively, of the dangers of immorality,

and of the necessity of early treatment if they should unhappily become infected. Punishment of infected men was recognized as leading to concealment of disease, and consequently put a stop to. The monthly venereal inspection was continued, but made of a more private nature. It seems, however, that this characteristic was in time lost sight of, and the inspection appears to have gradually dropped out of practice altogether. Rules were issued for the identification, by men suffering from venereal disease, of the women who had infected them. A document, the *bulletin de déclaration*, containing the information as to the nature of the disease and the address of the suspected woman, was to be dispatched to the local police. The results do not seem to have been very satisfactory. M. Legrand, *Médecin-Major au 3^e dragons*, in a discussion at the *Société de Médecine Militaire Française* in May 1907,¹ stated that at Nancy during a space of five years the *déclarations* made by the men of his regiment had not in a single instance led to any result. In 1907 a fresh circular was issued with instructions for general and personal prophylaxis.

Annually, as soon after the incorporation of recruits as possible, the medical officers of units were directed to give lectures to the non-commissioned officers and men on venereal diseases, the manner in which they develop, their danger to the individual and to the race, their treatment, and especially their prevention.

They were instructed to take every opportunity, by friendly conversation, &c., to explain the meaning of the lectures, and not to hesitate to enter into details regarding the measures, indicated by modern researches, necessary to avoid the results of exposure to infection, as, for example, the prevention of gonorrhoea by cleansing the urethral passage with solution of permanganate of potash, or avoiding the development of chancre by the use of calomel ointment.

In order to enable soldiers to apply these measures of prevention, the instruction requires that in each regimental *infirmerie* a special place shall be set apart for keeping ready the necessary antiseptics and utensils, so that men returning to barracks may go there and use them under the supervision of the medical orderly on duty (*infirmier de garde*).

An additional circular was issued by the French War Office in November 1907, amplifying the rules for the more efficient carrying out of the above measures.

In Prussia it is obligatory on every person suffering from

venereal disease to seek treatment, and power exists to enforce such treatment if necessary.

Schweining² may be taken as giving the latest authoritative expression of opinion on the subject. He lays great stress on the value of education. He emphasizes the importance of impressing on the young soldier the fact that chastity is not at all harmful, and warning him against the dangers and temptations of towns. He lays particular stress on the fact that low drinking-booths are often brothels in disguise, in which the majority of the women are diseased. He thinks, however, that the sexual passion lies too deeply rooted in human nature for us to expect the universal observance of chastity, and indicates the lines on which the young man should be taught to avoid the dangers consequent on fornication. Cleanliness is the first lesson, and this should be encouraged by the erection of private ablution rooms in barracks. These will also facilitate the practice of disinfection after connexion. Dr. Schweining recommends for this purpose the use of 10 per cent. protargol-glycerin and a calomel ointment, on the same lines apparently as that used in the French army. This is to be used to smear the glans and foreskin prior to coitus. After connexion the man is recommended to wash the parts with soap and water, and again smear the parts with the same ointment. On the general question as to the value of these rules the writer is obviously dubious. The first difficulty arises on the question of the manner in which the distribution of disinfectants is to be carried out. It is essential, if these are to be used, that they should be issued gratis; otherwise only the more well-to-do soldiers will use them. The use of automatic 'penny-in-the-slot' machines is therefore impossible. The only other method is to follow the French custom and have a special room connected with the medical inspection room (*Revierstube*) where men can procure the necessary materials under the supervision of a non-commissioned officer of the medical corps. This of course entails the prolongation of this man's duties until such time as the last soldier returns to barracks. The whole question, as Dr. Schweining concludes, bristles with difficulties.

The Austro-Hungarian War Office has been making experiments in prevention of venereal disease since 1904. These have followed much the same lines as those noted in connexion with the French army.

In the army of the United States personal prophylaxis has also been attempted. An interesting article³ by Captain Robert Grubb, Medical Corps, United States Army, gives an account

of this system as practised in the Philippines, where venereal diseases appear to be prevalent to twice the extent that exists in the United States themselves. The first step is to mark all men discharged from hospital but still requiring treatment, as for 'duty under quarantine'. This means that the man is under the surgeon's orders and must report at hospital for daily treatment under an attendant, and weekly for inspection by a medical officer. Meanwhile he is not relieved of the performance of any of his duties unless serious complication should arise. At the same time his liberty is partially restricted, so that he cannot indulge in drink, or disseminate his disease. A board, assembled for the purpose of considering the best method of ensuring personal disinfection, recommended the issue of certain 'venereal prophylactic kits'. These 'kits' consist of a small pasteboard box containing a 4 c.c. stoppered vial filled with a 20 per cent. solution of argyrol, a 4 c.c. stoppered vial filled with a 30 per cent. calomel-vaseline ointment, and one or two grammes of absorbent cotton. Brief directions were placed on each box, and the issue of these 'prophylactic kits' to each individual is preceded by a simple worded, plain-spoken lecture, explaining the *raison d'être* of the issue. The lecture is undoubtedly plain-spoken. After a brief statement of the prevalence of venereal disease in the army, it passes to a pathological description of the various lesions characteristic of the various forms of disease, and of the terrible consequences entailed on the innocent wife and offspring (potential) of the infected man. So far no exception can be taken to the address, which was clear, and not overdrawn. The last half of the lecture, however, is concerned with the method of using the 'prophylactic kit'. Here I must, I confess, speaking only for myself, draw the line. I cannot conceive that it is any part of the duty of a scientific man to explain to men who are supposed to look on him with respect, as a social, military, and intellectual superior, the method in which they can best indulge in irregular sexual intercourse, and escape the possible consequences. It is no use to tell a man, as Captain Grubb does, that 'sexual intercourse is absolutely not necessary for health' and that he 'will be a better and healthier man without it', and at the same time give him detailed instructions as to how he may indulge in it with safety. The soldier is ready enough to doubt the former statement, and the second is only doubtfully true in any case. The obvious argument that will arise in his mind is, 'If intercourse is not necessary for my health, and if I shall be better without it, why does my officer go out of his way to

make it safe?' No medical officer would think it his duty to instruct a man how to get rid of the effects of drunkenness, and, if he did, he would at once recognize that he was encouraging drink. The same argument applies to the French system of keeping a non-commissioned officer out of bed for the purpose of disinfection of men who have let their lower selves get the better of them, till such time as it shall please the last of these to return to barracks. It is lowering the dignity of the uniform to expect one branch of the army to perform such duties for any other, and the dignity of the uniform is the dignity, not of the individual who wears it, but of the nation.

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CHAPTER IX

GENERAL CONSIDERATION OF EFFECT OF PREVENTIVE MEASURES AND THEIR EFFICACY AND PROPRIETY

HAVING now studied the history of preventive measures as practised in the British army, it is necessary to glance shortly at the effects produced by them during their continuance. And for this it is only necessary to refer to the comparative curves published in the report of the sub-committee of the Army Medical Advisory Board, appointed to consider the question of the treatment of venereal disease in the army (originally prepared for the First International Congress on the Prevention of Syphilis and Venereal Disease (Brussels, 1899), by Lieut.-Col. W. G. Macpherson, C.M.G., R.A.M.C.). These curves show the admissions per 1,000 of strength for primary venereal sores at fourteen protected and fourteen unprotected stations, between the years 1860 and 1896—that is to say, from a date four years anterior to the first Act, to one ten years later than the Contagious Diseases Repeal Act. The first and most obvious fact that strikes one in looking at these curves is their parallelism. Though the curve for the unprotected stations is as a whole higher than that for the protected stations, more especially during the years 1866 to 1886, whilst compulsory examination was in force, still they seem to follow the same general trend. The upper curve is the more irregular, whilst the lower curve presents fewer variations; but they both fall at first, though this is less marked except in 1866 in the unprotected stations, and from the years 1875 and 1876 they both rise steadily. Obviously compulsory examination and detention did not in the years 1876 to 1882 have any effect in keeping down the amount of venereal disease, which mounted up steadily in the protected stations from 30 to 80 admissions per 1,000 (speaking roughly), whilst in the unprotected stations the rise was from 80 to 180 in the same period. The increase in the unprotected stations was thus proportionately somewhat less than in the protected. It is true that immediately after the introduction of the Act of 1866 there was a marked rise in the unprotected stations, but this was followed by two very marked

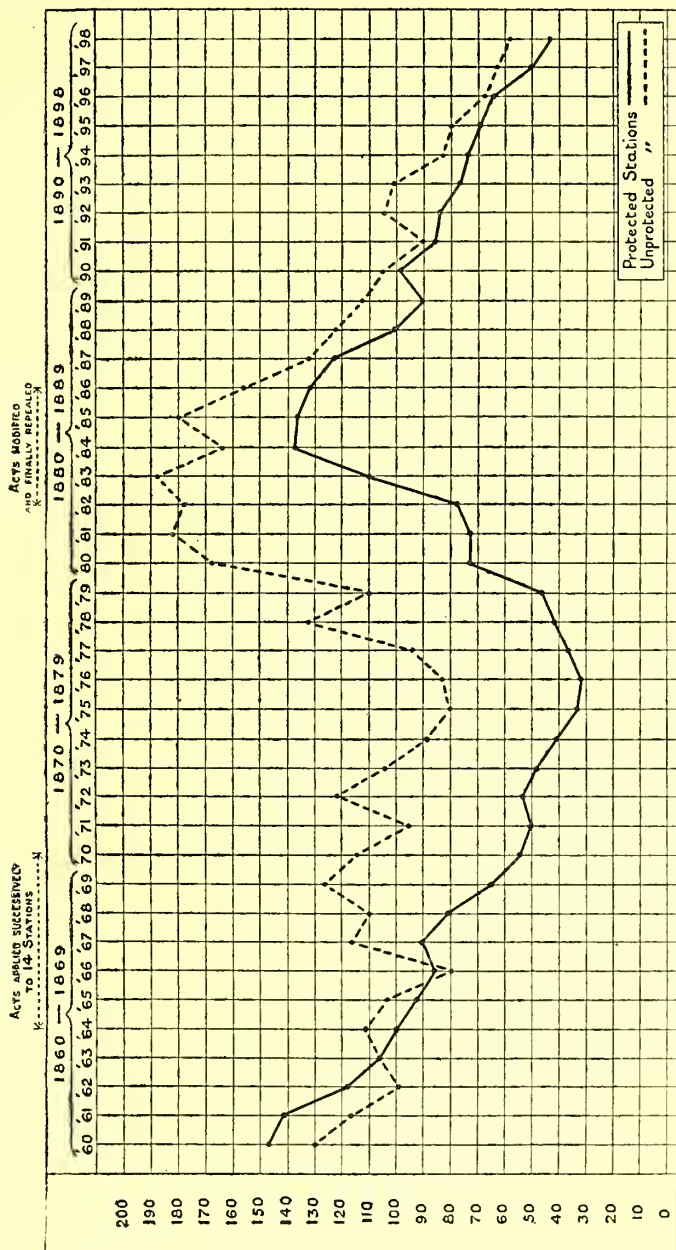


FIG. 10. Curve showing the difference in the admissions for primary venereal sores amongst British troops before, during, and after the Contagious Diseases Acts were in force, at fourteen protected and fourteen unprotected stations in the United Kingdom.

(This curve was originally prepared by Lieut.-Colonel W. G. Macpherson, C.M.G., Royal Army Medical Corps, for the first International Congress on the Prevention of Syphilis and Venereal Diseases, Brussels, 1899.)

falls. It is true also that there is a marked increase in the fourteen protected stations after the relaxation of rules in 1882, but this is only the continuation of a rise originating six years previously. Again, the total repeal of 1886 is followed by a very marked fall in both curves, which, however, dates from 1883 in the case of the unprotected and from 1884 in the case of the protected stations.

On the general question of compulsory periodical examination, with compulsory registration and detention of all prostitutes, the evidence furnished by the experience of the operation of the Contagious Diseases Acts in England is purely negative. The most that can be said is that they exercised a moderating influence, keeping the admission-rates lower in protected than in unprotected stations, but in no way interfering with the general trend of events in this respect. The evidence from India is not dissimilar. Up till the end of 1888 (see Fig. 4) the Contagious Diseases Act was in force, and as a rule stringently administered, but in spite of this venereal diseases as a whole steadily increased in frequency, until from 225 per 1,000 in 1881 the admissions had risen to 353 in 1888. True the repeal was followed by an increase in this rise, but this was followed by a marked fall in the years 1891 and 1892. The maximum was attained in 1895, with an admission-rate of 530 per 1,000, but since then there has been a steady and progressive fall, only in slight part assisted by the mild Cantonment Act of 1898. If compulsory periodical examination and detention could ever be efficacious then a country where prostitution is looked upon as an unavoidable, and by no means a necessarily dishonourable profession, should be the best field for its work. Clandestine prostitution of course exists, but by no means to the extent that it does in Europe, and the fact of detention in a Lock Hospital is hardly considered a stigma. In my own experience of Lock Hospital work in India—not a very extended one it is true, but sufficient to learn the feelings of the class of women concerned—I was only once petitioned by a woman to allow her daughter to leave the hospital in which she was detained, and the grounds of that petition were not at all the disgrace attached to the girl's position, but only that while so in durance she was unable to support her aged mother, herself once a member of the same profession, but at that period, if the expression may be permitted, *rude donata*. And yet the Contagious Diseases Acts were a failure in India. They did not prevent the admission-rate for venereal disease from increasing in the '80's, and their repeal did not prevent that rate falling in the late '90's.

The fact is that the problem is by no means a simple one, certainly not so simple as stated by Professor Fournier at the International Conference of 1899, at Brussels, as follows:¹ 'A woman is diseased; if we detain her she will not be a centre of infection, if we let her go free she will infect three or four men every evening.' So stated the problem is simple, so simple that if the presentment were correct, the logical consequences of a properly administered Contagious Diseases Act would be the complete cessation of venereal disease. The difficulty lies in the fact that it is not a case of 'a woman' but 'women', and by no means necessarily that class of woman that we designate as prostitutes. The basis of prostitution is promiscuity, and every woman who is promiscuous in her favours is a prostitute, whatever the impulse may be that guides her conduct. But if we are going to make the net so wide as the above, how are we to control the activity of our preventive measures?

If we could limit the term only to those who take money, as in fact we habitually do, the question of prevention would be simpler. A woman who has to live by prostitution will be more ready to take a purely business view of the matter, and less likely to object to any measures that in the long run safeguard her, and tend to make her a more efficient practitioner. But the woman who with a view to increasing her pocket-money, or for sexual gratification, or mere empty-headed viciousness, indulges in illicit connexion, does not wish to be so hampered. If unfortunately she become diseased, her one aim and object is to conceal the fact, the revelation of which will at once publish abroad her frailty. At the same time she is able, since her livelihood does not depend on fornication, to desist from the practice of this vice till she is cured secretly. And it is this woman who is infinitely the most dangerous. That this is the case there is no doubt at all. In the French *Statistique médicale* of 1888² we read: 'In the First Army Corps the greater number of the medical officers blame clandestine prostitution. At Lille in particular, as a result of an outbreak of syphilis and venereal sores, inquiry discovered a number of cabarets served by women, most of whom were diseased. In the Eighth Army Corps clandestine prostitution, which develops more and more from many and diverse causes, is the cause of the increase of syphilis.' In the Twelfth Army Corps, 'Always and everywhere clandestine prostitution, the prostitution of waiting maids, street-walkers (*racoleuses de la rue*), occasionally working girls'. And the report sums up the situation as follows: 'In spite of everything general experience

almost without exception points to the ineffectiveness of official prophylaxis, and the want of success of the *service des mœurs*. Inspection of women denounced as being diseased has always given negative results, although the accusations had been made in good faith.' The same note is struck in the reports of subsequent years.

A very striking confirmation of this fact is given by a discussion held at a meeting of the *Société de Médecine Militaire Française* in 1907, an account of which is published in the journal of the society. Monsieur Debrie, *Médecin Principal de 2^e classe*, stated that the unrecognized prostitutes, who were outside all supervision, were three or four times as numerous as those whose names were registered. These uncontrolled women were very largely hotel servants, girls serving in the more disreputable class of hotel, of which establishments there were no fewer than eighty-four in his garrison (Fontainebleau) though the military strength was only 2,500. These women were wretchedly paid by their employers, at a rate of 15 francs a month, and were practically driven to practise prostitution. The majority of these women were diseased. On the other hand, the registered prostitutes in the same garrison, though few in number, were extremely clean.

If further proof of the enormous amount of syphilitic infection that exists in Europe—which no police measures can ever hope to deal with, even if they could identify the sufferers—be needed, it is only necessary to refer to the words of Professor Fournier, at the International Congress at Brussels in 1899, on this point. After speaking of the benefit to be attained by immediately segregating the infected prostitute in hospital, he continues,³ 'Syphilis abounds everywhere amongst the upper classes to such an extent that, one might almost say, the higher we go in the social scale the more do we meet with this disease. And why is this? Simply enough, because the exalted personage, the noble, the great financier, does not think it beneath his dignity to come down from his pinnacle and to reap disease in a slum. Again, syphilis is very common in the middle classes on account of the kept mistress, who is one of the most important vehicles for the dissemination of this disease. Again, how shall we deal with the fashionable courtesan, the kept woman of ten lovers, with her horses, carriages, her private house and servants? We cannot, we are helpless. We cannot touch her by any measures short of the reinstitution of the censors of ancient Rome. You ask me if I am content with the regulation as it now exists. No, I am not. Yet I am in favour of it, because it is better than nothing

at all (*parce qu'elle fait un peu de bien*). It controls but a small number of women, but at least it controls those.'

It is obvious, therefore, that repressive measures applied to women can never be expected to touch more than the fringe of the evil. By far the greater part of the prostitute class will always remain beyond the reach of the police. There can hardly be a more glaring instance of one law for the rich and the other for the poor than a Contagious Diseases Act worked, as it inevitably must be worked, under any conceivable social system where any liberty at all is left to the individual woman.

But the cardinal vice of all repressive measures lies deeper than this. It consists in the fact that they are aimed at one sex only, and that one the sex which, taken as a sex, is in this matter the less culpable of the two. It may be accepted as an axiom that the number of men who lead irregular lives is enormously greater than that of women who follow the same courses. And when the question of responsibility is considered, it is quite certain that a great proportion of these women have fallen to their unhappy position as the result of the brutality or selfishness of some man. Even if it were possible, which it obviously is not, to identify immediately every woman who indulges in even casual fornication and examine her, only half or rather less than half the evil would have been tackled. I have shown already, if it wanted showing, that even of those whom we know to be prostitutes a large number must always remain out of reach of the police. We cannot deal with even half the women, and we do not pretend to deal at all with the men. The periodical examination and detention of men leading irregular lives is so outside the range of practical politics that the adoption of these measures could never be seriously contemplated by the most thoroughgoing advocate of repression. The Act of 1866 looked on every known prostitute as potentially diseased, a very sensible view to take. But in the same way every male libertine is potentially diseased, and what is sauce for the goose is, or should be, sauce for the gander as well. One of the strongest arguments in favour of repressive measures that their advocates can bring forward is the unhappy fate of the innocent individuals who marry or are the offspring of syphilitic persons. But it must be remembered that for every single case where the injured person is the husband, in ninety-nine it is the wife who is the innocent victim. If repressive measures are to be logical they must apply equally to both sexes, and if only to one sex, then the sex selected for penalization should be that one which is the more generally immoral of the two, and un-

doubtedly the more to blame for the infection of innocent people. But it may be objected, and the objection is quite reasonable, administration is never logical, it is merely and frankly opportunist. It does, not what it would in a world guided by pure reason, but what it can in a community ruled by prejudice and tradition. The periodical examination of all being impossible, surely the examination of those who can be drawn into the net of a Contagious Diseases Act, like that of 1866, is better than a policy of mere *laissez faire*. Men cannot be got hold of, women can, and even if we cannot lay our hands on all the women who practise prostitution, we can control some of them, and that is better than nothing. This argument would be perfectly sound if it applied to any other crime than fornication, to any other shortcoming than one so immediately dependent on sex relations, and so closely connected with the spiritual nature of mankind. Any law like the Contagious Diseases Acts entails, there is no doubt about it, in fact if not in intention, the State recognition of fornication as a necessary vice. It does not aim at punishing women (men it ignores entirely) who indulge in prostitution, as it punishes pickpockets, or murderers. It merely interferes with their practising their trade to the detriment of the public. Justifiable enough if the trade is a necessary one, even in the sense that the trade of a tobacconist or public-house keeper is necessary. There is nothing wrong in smoking or in drinking, only in smoking or drinking to excess. The former is foolish, the latter makes a man a nuisance and a danger to the public. But fornication is essentially wrong, whether in moderation or excess. It may be, and is, quite justifiable for the State to recognize the drink trade, and to regulate it so as to minimize drunkenness, since the latter is by no means a necessary corollary of the former. But the regulation of prostitution to prevent venereal disease is a different matter. Drunkenness is the result of drinking to excess. Venereal disease is not the result of excessive impurity. Looked at from the purely social point of view, drinking is no sin, whereas drunkenness is. On the other hand, fornication is a social sin, but venereal disease a mere misfortune. It is morally quite justifiable to so regulate an essentially innocent act as to prevent the excess which makes it a social crime, but it is not justifiable to regulate the practice of a sin in order to save those who indulge in it from the possible consequences.

If those consequences are apt, as in the case of syphilis, to be far reaching and to affect others, who are innocent of the sin in which they originated, then it is morally justifiable, and socially

speaking expedient, to restrain the diseased person until cure is effected, just as much in the case of the great as in that of the small-pox. And it would be right in the same way to punish the wilful spreader of either disease. The syphilitic person who marries, knowing him or herself to be still uncured, commits a crime which is morally a felony (defined in the Oxford New English Dictionary as 'villainy, wickedness, baseness; guile, deceit, treachery'), and which should in law be treated as such. And in ninety-nine cases out of a hundred the criminal is a man, against whom no repressive measures are ever directed. The only justification for such measures is success. Success covers a multitude of sins in an opportunist world. But partial success, and even that is in this case difficult to attain, is no justification.

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CHAPTER X

CONCLUSION

Is there nothing then to be done? Must matters be allowed to run their own course, and the soldier be exposed unhelped to the dangers of a garrison town at home, or a foreign Yoshiwara? By no means. Much can be done, and I propose to state briefly what in my opinion can and ought to be done in this matter.

In the first place the young soldier must be educated up to the pitch of recognizing that fornication is not an absolute necessity of existence, much less a satisfactory proof of manhood. It is not so very long since that in the circles which are commonly known as 'Society' drunkenness was looked upon with, to say the least, a kindly eye. To get drunk was at the worst an amiable failing, to drink to excess the sign of a man, not to drink at all a weakness to be concealed, certainly by no means a habit to be boasted of. A similar view as regards sexual irregularity held its own for some time after drinking to excess had come to be looked on askance. It is not many years ago since young men of the middle class were apt to look upon a 'dose of the clap' as a regrettable incident, perhaps, but certainly a sign of virility. Now such a confession would be looked on as rather disgusting. At the same time it would require some moral courage for a young man to declare openly in a smoking-room or round the billiard table that he had always led a chaste life. He would certainly be laughed at, and the majority of his contemporaries would be apt to look on him as decidedly lacking in manliness. It is unnecessary to dwell on the great change that has come over public opinion in the matter of drink. The majority of men drink but little; it is considered 'bad form' to boast of drinking to excess. A similar change is coming over public opinion in the matter of unchastity. I feel confident that the time is not far distant when it will be considered just as natural for a young man to lead a chaste life until marriage, as it is at present for the same young man to arrive at years of discretion without getting into trouble with the police on account of being drunk in public. Education then is the first line of defence. This educa-

tion must aim first at developing the moral tone, and inducing the recruit to take a more sane view of the sexual appetite. Secondly, since lofty moral sentiments alone are apt to lack weight with young men, the dangers of infection and the possibly terrible results of venereal disease must be pointed out to him. In this there must be no mealy-mouthed hinting—the facts are facts, and plain black and white is the best medium for their presentation. And here I would point out that the State is responsible for placing the young soldier in a sexually abnormal condition, particularly abnormal considering the early marriage age of the class from which he springs. It is, therefore, not only to the advantage of the State, it is its manifest duty, that it should do all in its power to prevent the young soldier from falling into those habits of promiscuous incontinence to which his position renders him so liable. This duty it can, of course, only carry out through its officers. And in saying officers I do not limit the term to the officers of any one branch or department. Every officer in the Service, regimental officer, medical officer, and chaplain, every officer who is responsible for the moral and physical welfare of the men, or who wishes to see the ranks full instead of depleted, is equally interested. To begin with, as officers of the army, we are concerned solely with the men ; the women are outside of our purview. Now it appears to me that our work as regards the men may be divided into two parts. The first part is to influence men towards continence. *Syphilis insontium* may occur undoubtedly, but is comparatively rare, and it is safe to teach the young soldier that if he lives a chaste life his chances of contracting venereal disease are far less than those of his contracting small-pox. It may seem a counsel of perfection, and to a certain extent so it is. But it is a fact that there are a large number of men who do practise continence for considerable periods, namely, those who put themselves into serious training for athletics, and it is also a fact that they are physically all the better for doing so. Again, there is a considerable social class, the Quakers, amongst whom moral and sexual purity is highly estimated, and I believe syphilis is almost unknown amongst them. The counsel may be one of perfection, but it is not therefore one of impossibility. Next it should be pointed out to the young soldier that not only is continence possible and healthful, but that incontinence, so far from being a sign of manliness, and a habit to be proud of, is a sign of weakness, and a thing to be ashamed of. Having got thus far the young soldier should next be told how he may best avoid the inevitable temptations to incontinence that attack the

healthy male adult. The majority of soldiers are fond of athletics, and the performance and practice of these should be encouraged, since there is no better method by which clean thinking can be fostered. This is a matter which of course comes more directly under the regimental officer than the medical officer.

I have said so much on the subject of temperance and its great influence on the question of the prevention of venereal diseases when discussing the historical part of our subject, that it is unnecessary to return to it here. This, then, is the first part of a rational system of prevention, to teach the young soldier that continence is possible and healthful, and that it may be best attained by leading an active, temperate, clean thinking, clean talking life. The second part is to teach him the dangers of incontinence, and the possibilities of ill health that may result from a single false step. Thirdly and lastly, if in spite of all encouragement, assistance, advice, and warning, the soldier persists in a course of life that renders him from time to time incapable of performing his duties, the powers of discipline may fairly be called in to punish him for so doing, as in the case of the analogous vice of drunkenness. It may be objected that in punishing a man for contracting venereal disease we are punishing him, not for committing a crime, but for being so unfortunate as to be found out. But this objection applies to all discipline. We do not punish a man for drinking, but for being so unfortunate as not to be able to conceal the effects of drink. His comrade with a 'stronger head' may drink much more and escape detection. So, too, one man may by incontinence expose himself repeatedly to the risk of infection, and escape, while his unfortunate comrade falls a victim to his first false step. This cannot be helped.

The difficulty with all such disciplinary measures is of course the risk of their leading to concealment of disease. This may to a certain extent be avoided by insisting on the soldier making up the tale of duties, escaped while in hospital, after discharge. The hardened sinner would know quite well that the longer he stayed out of hospital concealing his disease, the longer he would probably have to remain in hospital for recovery, and the more guards, &c., he would have to make up. Particular and very severe notice should, I think, be taken of any man who, while under treatment out of hospital for secondary syphilis, was found to have contracted gonorrhoea or soft chancre.

The essence of the system that I suggest is that we should begin

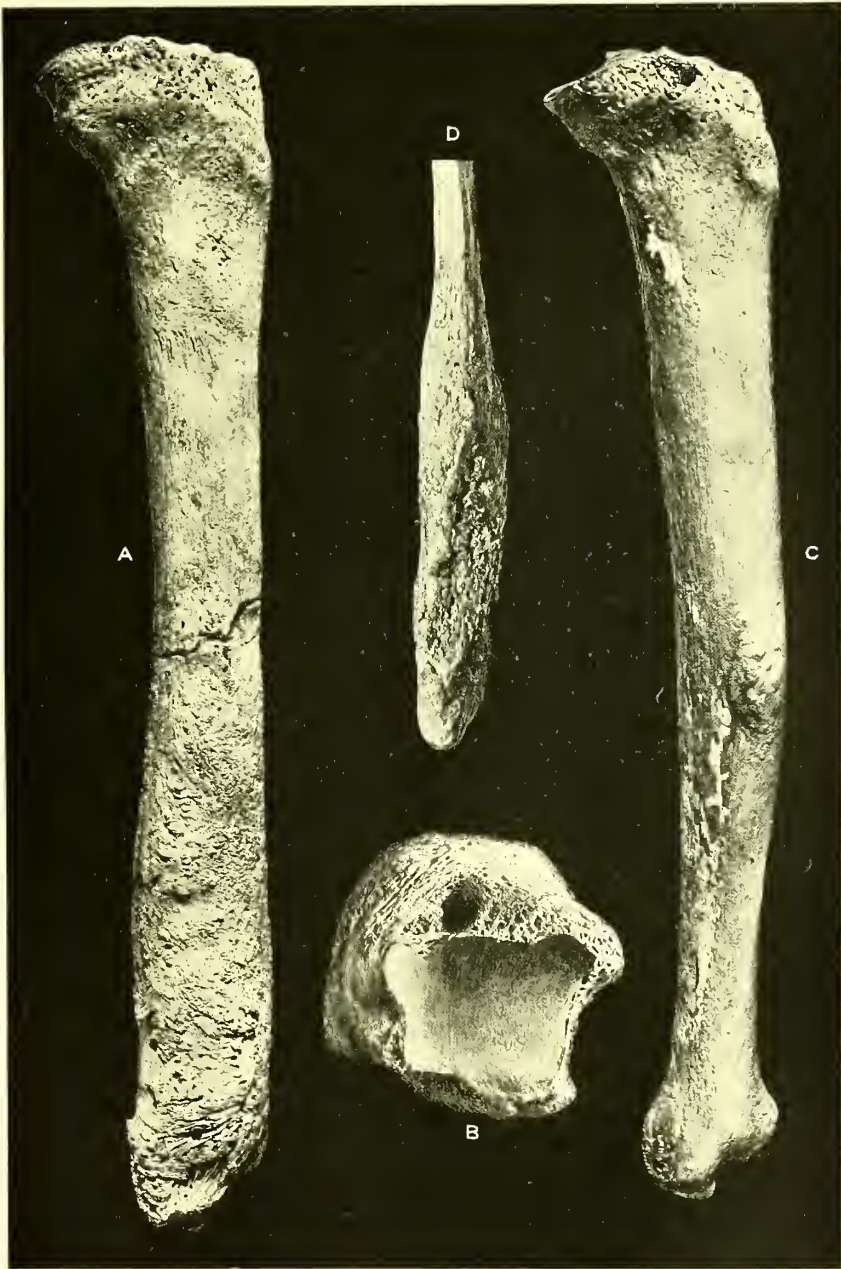
by placing a high ideal before the soldier as being at least possible of attainment. I do not consider it a valid objection to say that the ideal is too high. We all know that the higher you place your ideal the higher you are likely to attain, and this ideal is attained by many men over prolonged periods, and by some men maintained until marriage. All other systems of prevention accept incontinence as a necessary part of male life, and aim at making it safe. They place the ideal, if it can in any way be called an ideal, as low as possible, and figures prove that they fail to in any way attain to their ideal, that is absolute safety. To use a phrase of the late Lord Salisbury, 'they put their money on the wrong horse.' Let us at least try the high ideal, and instead of saying that incontinence is a necessity, say that continence is possible, and the best policy in the long run. We need never hope for absolute success, or to get an army of Galahads, but we shall have the satisfaction of knowing that every diminution in the rate of admissions for venereal disease means not only so many more healthy men in the ranks, but so many more men who have learnt the virtue of self-restraint, and thereby benefited not only their bodies, but their characters. Human nature being what it is, we must still have recourse to fear, and the danger of possible ill consequence, to keep men in the narrow path, and, in the last resort, the scourge of discipline to drive those that will neither lead nor be led therein, but the high ideal should come first.

Charles H. Hutchins

PLATE I



PLATE II





PATHOLOGY AND MICROBIOLOGY OF
SYPHILIS AS APPLIED TO THE
PUBLIC SERVICES

BY

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CHAPTER XI

THE MICROBIOLOGY OF SYPHILIS

It is not surprising that a disease so remarkable in its character and of such importance to the community as syphilis, should have occupied the attention of so many distinguished workers in the search for its cause for so many decades. The fact that, previously to the discovery of the *Spirochaete pallida* by Schaudinn and Hoffmann¹ in 1905, the enormous amount of work which was done in this direction was fruitless in no way detracts from the merit due to the long list of devoted workers who spent so much time and energy on the research; for Schaudinn's discovery, which was almost as great a triumph for the sciences of optics and of chemistry as for microscopical examination, proved that his predecessors had worked under impossible conditions. Space will permit of only the very briefest account of a few of the many micro-organisms which were arraigned as the cause of syphilis immediately before Schaudinn's discovery.

Probably the most noteworthy of these was a bacterium, morphologically and in staining properties very similar to the tubercle bacillus, which was announced in 1884 by Lustgarten,² who had found it in chancres and in the internal organs of some syphilitics. At the time the latter fact, which was confirmed by many expert bacteriologists, very strongly supported its supposed relationship to syphilis; because though an organism found in an open lesion might easily be a harmless saprophyte, it was difficult to ascribe the same rôle to it when it apparently occurred in internal organs. An explanation of its supposed presence in internal organs was supplied, however, by the probability that the acid-fast bacillus discovered there was the tubercle bacillus, while the similar organism found in chancres could not be dissociated from a common saprophyte of the genital organs—

the smegma bacillus—so that, though Lustgarten's bacillus held a strong position for some years, the belief in its relationship to syphilis had finally to be abandoned.

Diphtheroid organisms were announced by Van Niessen³ and by Joseph and Piorkowsky⁴ as the cause of syphilis in 1889 and 1902. The latter adopted the ingenious plan of sowing human placentae with semen of syphilitic persons, in the hope that the virus of syphilis would be encouraged to grow *in vitro* on a medium which apparently favoured its growth in nature.

In 1905 Siegel⁵ announced the discovery of a protozoon, which he continues to believe is the cause of syphilis. From its generic relationship to similar organisms which he had found in small-pox, foot and mouth disease, and scarlet fever, he named it the *Cytorrhycles luis*. Siegel described and figured several forms which he stated were stages in the development of this organism, and he also claimed to have transmitted syphilis to rabbits by inoculations with material containing only the *Cytorrhycles luis*. These claims have received little credence from other workers, chiefly from the failure of the latter to discover the forms described by Siegel in syphilitic lesions, and, indirectly, from experimental evidence which goes to show that one method of inoculation largely used by Siegel—that of subcutaneous injections—almost invariably fails to produce syphilis in anthropoid apes, the only animals lower than man which show clinical evidence of syphilis in a later stage than the primary. Whether the *Cytorrhycles luis* will eventually be proved to be a product of the technique adopted for its demonstration, as Schaudinn believed, or, as others consider possible, a stage in the life-cycle of the *Spirochaete pallida*, must remain an open question, but in any case its discovery deserves a place in history if only for the fact that it led, indirectly, to that of the *Spirochaete pallida*.

As a result of Siegel's assertions, on the suggestion of Dr. Köhler, President of the Imperial Board of Health, Berlin, a commission was appointed to inquire into and if possible confirm them, and the late Dr. Schaudinn, already an eminent protozoologist, and Dr. Hoffmann, an expert syphilologist, were appointed members, with Drs. Neufeld and Gonder. Schaudinn

and Hoffmann very quickly classed the *Cytorrhycles luis* as organic débris, and thus disposed of its connexion with syphilis. At the same time Schaudinn noticed the presence of some exceedingly delicate spirilla in the exudation from a chancre which he was examining. This was by no means the first time that spirilla had been discovered in connexion with the genital organs, both in health and disease. In 1837 Donné⁶ discovered in chancres certain 'vibrios'; after considering these for a time to have some relationship with syphilis, he finally discarded them as non-pathogenic. Since Donné's time, workers have repeatedly announced the discovery of spirilla in chancres, but it is probable, considering the apparatus at their disposal, that these were dealing with *Spirochaete refringens*, a very common inhabitant of ulcerated surfaces. Mention must be made, however, of the fact that Bordet and Gengou,⁷ in 1903, saw delicate spirochaetes in the fluid from the depths of a chancre, but proceeded no further with their observation. The peculiarity of the spirilla seen by Schaudinn and Hoffmann led to an inquiry into the nature of the various organisms of this nature to be found in diseases of the genital organs. The result of their research was the discovery that two spirilla were to be found in these conditions; one, a large organism easily stained and readily observed, which was constantly found in all conditions. This they named *Spirochaete refringens*, from its characteristics. The other, much smaller, more slender, having more numerous curves, difficult to observe in the living condition, and difficult to stain, appeared to exist only in syphilitic sores; this was named, from its characteristics, the *Spirochaete pallida*.

In the previous year, Metchnikoff and Roux had conducted a series of conclusive experiments (to be referred to below) which proved the susceptibility of monkeys, especially anthropoid apes, to infection with syphilis, and Schaudinn at once asked Metchnikoff to search for the *Spirochaete pallida* in his experimental lesions. The result was that, after a few failures, Metchnikoff was able to announce that he had found the delicate spirilla in chancres situated on the eyebrows and in secondary papules of infected chimpanzees; a discovery which, from the fact that the

situation of the lesions was far removed from the genital organs, lent great weight to Schaudinn's discovery. The finding by Levaditi⁸ of exactly similar organisms in the pemphigus bullae of hereditarily syphilitic infants, and that by Buschke and Fischer⁹ of their presence in the liver and spleen of a syphilitic foetus, while Schaudinn¹⁰ himself found them in blood drawn by spleen puncture from a case of syphilis the day before the rash appeared, further strengthened the belief that the micro-organism of syphilis had at last been discovered. Since these initial discoveries, confirmation has been received from workers in every part of the world ; so that, though absolute proof as to the causative rôle of the *Spirochaete pallida* in syphilis cannot be forthcoming till transmission of the disease by means of pure cultures of the organisms has been achieved, very little doubt can remain that infection by the *Spirochaete pallida* is the cause of syphilis.

The name *Spirochaete* requires some slight mention in this connexion ; owing to the fact that the organism discovered by Schaudinn and Hoffmann did not conform morphologically in certain particulars to the characters proper to the genus *Spirochaete*, on Vuillemin's¹¹ suggestion, Schaudinn¹² changed the name to *Spironema*. This name was, however, found to be already in use, so it was again changed to *Treponema pallidum*, and the organism is now more correctly known by the latter name. It appears certain, however, that when certain structural details of the organism have been cleared up, its name will undergo a further change, and in the following pages the term *Spirochaete pallida*, by which it is more commonly known, will be used in referring to it.

Description. The *Spirochaete pallida* is an extremely delicate, spirally twisted (corkscrew-like) organism, possessing several distinctive characters by which it can be recognised comparatively easily. The chief of these are its extreme tenuity, the regularity and close twisting of its spirals, its weak staining affinities, and, when examined in the living state, its low refrangibility.

In the fresh unstained condition it may be seen in hanging drop by using axial light, but this method requires the best optical

conditions, and, even with the aid of these, the observer must be one who is highly trained in high power microscopy.

With the aid of dark-ground illumination, however, which can be readily obtained by the so-called ultra-microscope, it can be observed with comparative ease as a delicate silvery spiral on a dark or intensely black background. Under these conditions, it is seen to be actively motile, bending on itself, spinning rapidly on its long axis, first in one direction, then in the other, and often appearing alternately to draw its coils together and to lengthen them out again to their normal width. Its movements of progression, which are in either direction, are comparatively slow, and it is fairly easy to keep the same specimen in the field for hours together.

One especially marked characteristic is the fact, first noted by Schaudinn, that when it comes to rest, temporarily or in death, the spiral form is rigidly maintained; this is unlike what occurs in other spirochaetes, with the exception of *Spirochaete dentium*, *Spirochaete pertenuis*, and certain spirochaetes which occur in ulcerating new growths. It frequently happens that when observed under dark-ground illumination only the crests of the undulations come in focus, and it then appears as a line of minute white dots; an appearance which is quickly succeeded by that of the typical spiral.

When successfully stained, its slender nature, already noted, is specially marked, as well as the slight affinity which it seems to have for the stain; while other elements in the film are intensely coloured, *Spirochaete pallida* appears of a delicate rose tint after the longest duration of staining by Giemsa's method.

Its diameter has been variously estimated at from $\frac{1}{10}$ to $\frac{1}{4}$ μ , but these estimates can only be guess-work to a large extent, as its measurement in this dimension is really beyond the powers of a micrometer.

In length it measures from 6 to 15 μ , though shorter forms have been noted, as well as specimens measuring as much as 26 μ .

It is remarkably uniform in thickness from one end to the other, but at each end it tapers off rapidly to a point of extreme tenuity.

Schaudinn,¹³ by the use of a flagellum stain (Loeffler's), as well as by observation of the living organism, convinced himself of the presence of a delicate cilium, measuring 3-4 μ at each pole.

The character of the undulations is a feature of great importance in the recognition of *Spirochaete pallida*; they are extremely uniform in width and in depth, the former being 1.2 μ from the crest of one undulation to that of the next, on the same side of the axis, and the latter, 1-1.5 μ . These measurements are very constant, so that the number of undulations naturally varies with the length of the spirochaete. In the absence of a micrometer a convenient way of arriving at an approximate measurement of the wave length is to compare the number of undulations with the width of a neighbouring red blood-cell; remembering that the latter is 7.5 μ , it will easily be seen that a corresponding length of *Spirochaete pallida* should contain 6-7 turns (Leishman).¹⁴

The above may be described as the classical characteristics and appear to be the most frequently found. Whether the spirochaete ever shows any variation from this type is uncertain, but without doubt forms do occur in specimens which, while recalling many of the features of *Spirochaete pallida*, show departures in some characteristics. Thus curved forms, figures of eight, and irregularly twisted spirochaetes are not infrequent, and Sir William Leishman,¹⁵ observing that they seemed to be most frequent in specimens prepared from ulcerated lesions, considers that they may possibly indicate the death of the parasite previous to the taking of the specimen; an opinion suggested by his own study of the living spirochaetes of relapsing and tick fever. Levaditi and Roché¹⁶ think that many of these irregular forms, especially those where the spiral appears pulled out in places, are due to irregular traction when making film preparations. They remark that these forms do not occur in fresh specimens, and certainly in many examinations of the living spirochaete, with the exception of loops and circles, I have never seen any of the irregularities which often occur in stained specimens. Under dark-ground illumination, it is a frequent occurrence to see two or three spirochaetes closely entwined and only distinguishable as separate parasites by those portions of their bodies which happen

to be free of the entanglement, and it is easy to conceive that in spreading a film some portion of another element in the specimen, e. g. a leucocyte, may catch on a portion of such an entanglement and drag it out into the most bizarre shape.

Extremely short forms of three or four undulations have been described by many observers, and are frequently seen in fresh specimens.

The *finer structure* of the spirochaete is a matter on which a vast amount of work has been done, but about which there is the greatest divergence of opinion.

Regarding the presence of a definite nucleus, Schaudinn was of opinion that the endoplasm was quite homogeneous, but other workers, notably Krzyztałowicz and Siedlecki,¹⁷ have described a swelling at the centre of the parasite in which a clear space occurs; they consider the latter to be a nucleus. As already mentioned, a terminal flagellum at each pole, about half as long as the parasite itself, was described by Schaudinn, who observed it in specimens stained by Loeffler's and Giemsa's methods, and even in living parasites. This flagellum, the existence of which has been confirmed by others, was considered of considerable importance in the classification of the parasite by Schaudinn, who also believed that he had seen longitudinal division, and, on these grounds, was of opinion that the organism was a protozoon, allied to the trypanosomes. An undulant membrane has not, however, been observed by any worker.

The *manner of multiplication* is another point on which no definite statement can be made. While those who consider the organism to be a protozoon hold that division is longitudinal, others, who believe it to be bacterial in nature, maintain just as strongly that division is transverse. When one considers the very minute size of the organism, it is easy to understand how these differences of opinion can arise. Details of finer structure can only be made out by prolonged staining, with resulting stain deposit, and it is very frequently impossible to satisfy oneself that some one particularly delicate point which one observes is really a fine structural detail, and not either stain deposit or an accidentally superimposed fragment of débris.

Again, in the matter of division, while it is easy to argue that a very long spirochaete, attenuated almost to breaking-point at its middle, is the product of a nearly completed transverse division, it is equally easy to assume that the same appearance is due to the incomplete separation of the two halves of a parasite which has divided longitudinally. Similarly, entangled forms may equally be the result of recent longitudinal division of one parasite, or accidental entanglement of two originally separate spirochaetes. I have frequently watched living spirochaetes for long periods, hoping to catch one dividing, and, though I have often seen what was originally a single parasite apparently become two entangled specimens, I have found it impossible to decide whether this was due to one parasite having divided, or to the sudden appearance of a second from a position above or below the focus.

In the matter of multiplication, Krzyztałowicz and Siedlecki, besides recognizing a vegetative longitudinal division, have described a mode of sexual multiplication, but the interesting observations of these workers have not been confirmed by others, and, in a later communication, they have themselves expressed some doubt as to the accuracy of their earlier work on this point.

The *genealogical position* of *Spirochaete pallida* rests on the settlement of its fine structural details, and, to a certain extent, on its manner of multiplication, and, until these points are settled, must remain in dispute. While Prowazek,¹⁸ Krzyztałowicz and Siedlecki,¹⁹ and many others strongly maintain its protozoal nature, Swellengrebel²⁰ and others believe that it is a bacterium, and perhaps the safest course is to hold, with Hoffmann,²¹ that it should temporarily be assigned to a position midway between the bacteria and the protozoa.

Cultivation of the spirochaete would throw much light on this question, but experiments have not so far been productive of conclusive results. Schereschewsky,²² by implantation of fragments of syphilitic papules, of gland tissue, and even of syphilitic blood on horse serum (prepared by inspissating to a jelly at 58–60° C. and autolysing at 37° C. for three days), claims to have obtained pure subcultures of a spirochaete which is morphologi-

cally indistinguishable from *Spirochaete pallida*. Mühlens,²³ by sowing pieces of syphilitic gland on Schereschewsky's medium, has obtained similar forms in pure culture. On the other hand, Levaditi and Stanesco,²⁴ using two modifications of Schereschewsky's method, have obtained impure cultures of two spirochaetes, one of which they consider to be *Spirochaete balanitidis* (Hoffmann-Prowazek), and the other they have named *Spirochaete gracilis*. The latter, which is extremely like *Spirochaete pallida*, was obtained from cultures of the serum from chancres and of balano-posthithic secretion. According to Levaditi and Stanesco, *Spirochaete gracilis*, though very like, is distinguished from *Spirochaete pallida* by

- (1) Its less regular form,
- (2) Slightly greater thickness,
- (3) More active movement,
- (4) Stronger affinity for dyes (taking a blue colour and staining more quickly with Giemsa's stain), and
- (5) Its non-pathogenicity for apes.

It is probable that the *Spirochaete gracilis* of Levaditi and Stanesco is identical with the forms obtained by Schereschewsky and by Mühlens, and, though it is quite possible that *Spirochaete pallida* might differ in culture from its progenitors in nature so slightly as this, and easily lose its pathogenicity *in vitro*, Levaditi and Stanesco's belief in the non-identity of *Spirochaete gracilis* and *Spirochaete pallida* must be supported. It is greatly to be hoped that successful cultures of *Spirochaete pallida* will soon be obtained, as success in this direction would probably clear up many important points. Amongst these is that of the existence of resting or developmental forms of the parasite. Leishman's²⁵ work on developmental forms of *Spirochaete duttoni* would lead us to suppose the probability of analogous forms existing in the case of *Spirochaete pallida*, and if such do occur, the fact may afford an explanation of the long periods of latency and the peculiarity of the later manifestations of the disease. At the same time the difficulty of obtaining cultures supports the protozoal nature of the organism, though it must be admitted that the leprosy bacillus is a bacterium which has also, so far, resisted cultivation.

Effect of physical and chemical agencies on Spirochaete pallida.

All the work which has been done on this subject has shown the extreme fragility of the spirochaete after its removal from the body. Regarding the duration of its movements at a room temperature, there appears to be some difference of opinion. While Levaditi and Roché²⁶ consider that movement ceases after six to seven hours, Beer²⁷ asserted that between a slide and coverslip, under precautions to prevent evaporation, he had seen it continue up to twenty-three days. On the other hand, Landsteiner and Mucha, observing Beer's precautions, were unable to detect movement after two days. I have certainly seen movement continue up to two days. At 37° C. Landsteiner and Mucha²⁸ showed that between slide and coverslip protected from the air, the parasites, after a preliminary increase in their movements, very quickly become immobile. At 45° C. they rapidly lose their movements, but on ice the latter increase for a time.

Whatever the duration of life may be under these conditions, it is undoubted that the virulence is rapidly lost. Thus Hoffman,²⁹ experimenting on the virulence of human blood in secondary syphilis, showed that inoculation of the monkey immediately after the removal of the blood was successful, while a very short time after, attempts to infect with the same blood entirely failed. The same writer demonstrated that the spirochaete had become harmless after being kept under anaerobic conditions for forty-five hours. According to Neisser,³⁰ the virulence is destroyed at once by drying; in three hours at 10° C. and in twenty hours on ice. These facts may possibly explain how it is that, considering the great prevalence of syphilis with open lesions from which the parasite must be infecting articles in common use, extra-genital chancre is comparatively infrequent.

Spirochaete pallida is incapable of passing a Berkfeld filter, and is even partly arrested by filter-paper. It is rapidly killed by all antiseptics, and, according to Prowazek,³¹ it is quickly dissolved by taurocholate of soda, while Landsteiner and Mucha³² have shown that saponine, which has a toxic effect on all protozoa, equally affects this organism.

CHAPTER XII

EXPERIMENTAL SYPHILIS

EXPERIMENTS on man have been performed at various times from the middle of the eighteenth century at least, but these do not seem to have established any very conclusive facts. From time to time, too, workers have claimed that they have succeeded in transmitting syphilis to widely differing animals, but it cannot be said that the results of the earlier experiments carried any conviction to the minds of others. Even the experiments of Klebs³³ (1879), who appears to have been the first to have tried to infect monkeys, and those of Sperk,³⁴ who probably did succeed in inoculating monkeys with the disease and transmitting it from monkey to monkey, were not generally believed. This was because the experimental sores bore only a superficial resemblance to the primary lesion in man; secondary lesions were not produced, and confirmation by the microscope was not then available.

The classical experiments of Metchnikoff and Roux³⁵ were conducted, however, at a more fortunate time. Evidence from other sources, anatomical and bio-chemical, had demonstrated the close relationship which exists between the anthropoid apes and man, and it occurred to Metchnikoff and Roux to experiment on chimpanzees. A chimpanzee (*Troglodytes niger*) was accordingly inoculated on the clitoris and eyebrow with virus from a chancre and from a mucous patch of two cases of syphilis. Twenty-six days later, a typical indurated chancre appeared on the clitoris, and this was followed a month later by a papulo-squamous eruption on the back, abdomen, and legs; some ulcers appeared in the mouth, and there was general enlargement of glands. From the chancre, forty-five days after its appearance, a second chimpanzee was successfully inoculated, a similar primary sore resulting. These initial experiments were confirmed by Lassar,³⁶ who success-

fully inoculated a chimpanzee, producing a typical indurated chancre, which was followed by secondary symptoms. Confirmation was later received from Neisser³⁷ and other workers, all of whom agreed on the great susceptibility of anthropoid apes to syphilis. The sites chosen for these inoculations were the eyebrow, eyelid, clitoris, and penis, and they were effected by scarification, followed by rubbing of the virus well into the scarified area.

The primary lesion appeared, as a rule, in twenty-two to thirty-five days, according to Metchnikoff and Roux,³⁸ though exceptionally it might appear as soon as the fifteenth or as late as the forty-ninth day after inoculation. Secondary symptoms occurred in about 60 per cent. of the chimpanzees inoculated, and consisted of papules, mucous patches, and palmar psoriasis with general enlargement of glands, which occurred at an interval of from nineteen to sixty-one days (average thirty-three) from the first appearance of the chancre. The secondary symptoms were rarely severe, but in two cases there was a severe generalized eruption with formation of brownish scaly papules, general alopecia, and, in one, profound cachexia and death. In this, and in some other cases, nervous symptoms appeared with the secondary lesions, in the form of partial paraplegia, which passed off completely in from three to seven weeks.

No tertiary symptoms have yet been described in chimpanzees, but it must be remembered that they are very delicate animals which do not live long in captivity ; so that these later manifestations have not had time to develop before the death of the animal from other causes.

In other anthropoids the gibbon has been shown by Neisser³⁹ to develop secondary symptoms, but the orang-outang appears to show only primary lesions, and these of a very modified nature.

Regarding monkeys of lower species than the anthropoids, the experiments of Metchnikoff and Roux,⁴⁰ Neisser,⁴¹ and Finger and Landsteiner⁴² show that these are much less susceptible to infection. Thus, whereas all the chimpanzees developed primary chancres after inoculation, the lower apes—Macaque, *Cynocephalus*, and *Cercopithecus*—gave a considerably smaller per-

centage of successful results. At the same time the incubation period was much shorter (average twenty-two to twenty-three days), the primary lesion was much less characteristic of the chancre seen in man and anthropoids, and the majority agree that neither secondary nor tertiary symptoms occur. That the primary lesion was syphilitic in these lower apes, however, was shown by the fact that it could be transmitted from monkey to monkey, that *Spirochaete pallida* was constantly present in the successive lesions, which were themselves like the original in the same species, and that subsequent inoculation with the virus was entirely without effect.

Experiments on animals other than monkeys, as noted above, had not given any very conclusive results till Bertarelli ⁴³ published the account of his experiments on rabbits, though it is necessary to note that Haensell,⁴⁴ a long time previously, by inoculation of gummatous material into the cornea and anterior chamber of the eye of a rabbit, had produced keratitis and iritis twenty-five days after inoculation; results which were similar to those obtained later by Bertarelli. It appears probable that if Haensell had had the advantage of the more refined microscopic technique of recent years, his work would have received more general recognition.

Bertarelli, by deep scarification of the rabbit's cornea in the neighbourhood of the limbus, or by introduction of the virus into the anterior chamber, produced, after an incubation of from a month to six weeks, a parenchymatous keratitis with some ulceration of the cornea. Subsequent examination of the cornea, stained by the silver method, showed, particularly at a slight distance from the ulcerated area, numerous spirochaetes disposed longitudinally between the layers of the cornea.

By passage from rabbit to rabbit the activity of the virus appeared to increase, so that while it was rare for the initial inoculation of the series to result in subsequent infection of both eyes, this frequently occurred after a number of passages. Bertarelli further succeeded in transmitting the virus from the rabbit's cornea to that of monkeys, guinea-pigs, sheep, and dogs.

These results were confirmed by Hoffmann and Brüning,⁴⁵ and others, amongst whom Schucht ⁴⁶ claimed to have demon-

strated that general infection occurs in rabbits, as he was able to produce a primary lesion in a monkey by inoculation with the kidney tissue of an infected rabbit. Numerous other experiments have shown that inoculation into the rabbit's testicle (Parodi)⁴⁷ and inoculation under the rabbit's prepuce⁴⁸ with fragments of infected rabbit's cornea are successful in producing lesions.

Mode of entry of the virus. Experiments on animals have demonstrated very clearly the conditions under which the *Spirochaete pallida* gains a foothold in the system. Thus Neisser's⁴⁹ experiments indicate that intravenous injection, like intraperitoneal, almost always fails to produce infection, though in more recent experiments Neisser did produce general infection by intravenous injection in certain cases. Subcutaneous inoculation has, for the most part, failed to produce either local lesion or subsequent immunity. Neisser inoculated in this way fifty-one monkeys and no local lesion resulted. On subsequent inoculation of these with active virus by scarifying the skin, thirty-three developed local lesions, a proportion correspondent to the natural susceptibility of the species of monkeys inoculated, and contrasting strongly with the immunity which follows successful inoculation.

Introduction of the virus directly into solid organs has failed to produce syphilis except in the case of inoculation into the testicle; an interesting fact in connexion with the frequency with which the testicle is involved in syphilis.

When the virus is introduced *into the skin or anterior chamber of the eye*, however, a syphilitic lesion generally results. The experiments of Neisser and of Ch. Nicolle⁵⁰ seem specially to indicate that situations where the spirochaete is likely to be nourished by a free flow of lymph and not exposed to the attack of phagocytic agencies in the tissues, or to the vicissitudes of outside influences, such as removal by friction or by washing, are the most favourable for enabling the parasite to obtain a footing. Such conditions are provided by the deeper layers of the epidermis in the case of the skin, and the deeper layers of the epithelium in the case of the mucous membrane. An insignificant

crack or abrasion, not deep enough to draw blood, is therefore the most favourable for introduction of the virus. A matter of some practical interest is the question as to how long the virus remains sufficiently near the site of inoculation to permit of its successful removal by excision of the infected portion of skin or mucous membrane. In one series of experiments, Neisser⁵¹ was able to prevent the appearance of the chancre by excision of the inoculated area twelve days after the initial scarification, but this was only in a single case, and in a later series excision eight hours after the inoculation failed to prevent the chancre. It would seem, therefore, that though the spirochaete requires special conditions to enable it to obtain a foothold, the latter is rapidly secured, and in a very few hours it has spread widely into the neighbouring tissues, though its demonstration by microscopic agencies may not be possible till somewhat later. Levaditi, Manouélian, and Yamanouchi have shown that if the tissues at the site of inoculation and its neighbourhood be examined a considerable time before the chancre makes its first appearance, evidence in the shape of exudation of lymphocytes and swelling of the vascular endothelium will be found to indicate that the parasite is already active in the tissues, and that the real incubation is considerably shorter than clinical appearances would lead us to suppose. There is, however, an appreciable latent period between the time of inoculation and the occurrence of microscopic changes in the local tissues, and Levaditi and Roché⁵² advance two hypotheses to explain this. One is that, if one considers that the parasite is a protozoon, it passes through some unknown developmental phase; and the other, which Levaditi and Roché favour, that it finds itself in a new medium, and consequently multiplies very slowly at first. These authors quote, in support of the latter explanation, Metchnikoff and Roux's⁵³ experiments on the *Macacus rhesus*, in which a series of passages from macaque to macaque of the same species resulted in a reduction of the incubation period from nineteen days to seven; showing that as the parasite became more and more accustomed to its type of host, it multiplied more and more rapidly. It must be admitted that this example would hardly support the theory as applied to man,

seeing that, under natural conditions, transmission is confined to the same species.

Neisser ⁵⁴ has shown that from a very early date after inoculation of monkeys, the spirochaete has invaded the organs. Thus he has been successful in demonstrating that the blood may be infectious on the fifth day after infection, though this is by no means always the case. By similar inoculation experiments, he has shown that the virus may be present in the spleen on the fourteenth day after infection.

The main route by which the virus invades the tissues would appear to be in some dispute, but experimental as well as histological evidence seem to indicate that it travels not only by the lymphatics but also the blood-stream, though which route it most favours is not known. During the period of quiescence which separates the healing of the chancre from the onset of secondary symptoms the parasite seems to prefer certain organs only for its habitat. Thus Neisser has shown by inoculation experiments, in which he used emulsions of the various organs of syphilized monkeys, that it is possible to infect only when spleen, bone-marrow, lymphatic glands, blood, and testicle are used. In other words, with the sole exception of the testicle, it is the haemopoietic organs which the organism favours during this period.

Regarding the infectiousness of material from the various lesions by which syphilis manifests itself, experiments show that those lesions in which it is possible to demonstrate *Spirochaete pallida* in greatest abundance are those which are most infectious. Thus, the initial chancre, secondary skin and mucous membrane lesions (especially condylomata and mucous patches), and lymph glands are constantly infectious. The blood does not appear to show the same degree of virulence, and, in fact, experiments were at first inconclusive till Hoffmann ⁵⁵ succeeded, twice out of four times, in infecting monkeys with blood which he had removed, with all precautions to prevent skin contamination, from the veins of syphilitics. Hoffmann showed by these experiments that the blood can be infectious from forty days after infection, i.e. two or three weeks before the rash appears, up till six months later. Neisser's work with the blood of syphilized monkeys has

already been mentioned. The inconstancy of its virulence is in accordance with the difficulty which attends every effort to demonstrate the spirochaete microscopically in the circulating blood. Regarding the infectiousness of semen, experiments by Neisser, Hoffmann, and others have mostly been negative. Finger and Landsteiner,⁵⁶ however, succeeded in infecting monkeys with the semen of two cases of syphilis. One of the latter was a case of a few months' duration and presented no signs of testicular disease; the other had been infected three years previously, and was suffering from syphilitic orchitis. Finger and Landsteiner's results are not surprising when Neisser's experiments, which demonstrated the infectivity of testicular tissue in syphilized monkeys, are recalled.

Tertiary lesions, though considerably less so than primary and secondary, have been proved to be infectious by Finger and Landsteiner,⁵⁷ Hoffmann,⁵⁸ and Buschke and Fischer,⁵⁹ amongst others. Finger and Landsteiner for the most part used tissue from the periphery of gummata, and, by their method of introducing the material in large amounts into sub-epidermic pockets, obtained a large percentage of successful results. Buschke and Fischer were successful with a tertiary ulcer seventeen years after infection, and with two cases of malignant ulcerating syphilides. In connexion with the latter it is of interest to note that the lesions which resulted from the experimental infection were in no way more severe than occurs in ordinary experimental syphilis, a fact which would indicate that malignancy occurring in syphilitic manifestations is rather due to the peculiarity of the individual than of the micro-organism.

CHAPTER XIII

DISTRIBUTION OF THE SPIROCHAETE IN THE TISSUES

IN the primary chancre, if untreated, the spirochaete has been the more constantly found on film preparations as the skill of the investigator increased, and the methods at his disposal became more perfect. In the early years which succeeded Schaudinn's discovery of the *Spirochaete pallida*, contributions recording the finding of the organism in chancres literally poured in from all quarters of the world. This was when staining methods were chiefly relied upon; now that dark-ground illumination has come more into use, one might almost consider a failure to find the specific parasites in a fresh untreated chancre as a reflection on one's technique. At any rate the author's experience is that it is extremely rarely that one fails to discover the spirochaete in these lesions provided that no antiseptic has been applied to the sore. Experience has shown that a specimen taken from the surface or from the centre of the sore frequently contains no specimens of *Spirochaete pallida* but many of *Spirochaete refringens*; that, in fact, the superficial layer of epithelium at the margin of the sore has to be removed before the presence of *pallida* can be demonstrated. Examination of sections of chancres, stained by the silver method, has supplied an ample explanation of this fact. As abundantly shown by Burnet and Vincent,⁶⁰ Levaditi and Manouélian,⁶¹ and many others, using the silver method of staining, the central ulcerated area is almost devoid of *Spirochaete pallida*, though *Spirochaete refringens* may exist in abundance at the surface without having penetrated the tissues. It appears certain from the work of Levaditi and Manouélian (loc. cit.) that in the beginning, before any ulceration occurs, *pallida* is to be found in the centre of the lesion in the deeper layers of the epidermis, and that it disappears from this position

under the influence of invading organisms and phagocytes. Round the ulcerating area, the Malpighian layer is invaded by *Spirochaete pallida*, which appears in greatest numbers in spaces between the epithelial cells, while the latter show the degenerative changes of swelling and granulation of protoplasm, and fragmentation of nuclei.

In the depths of the chancre the spirochaetes are found amongst the masses of exuded lymphocytes and of plasma cells which surround the small vessels. It may be said here that the vessels themselves show marked changes, resulting from the influence of the spirochaetes around them. These changes especially affect the endothelium, which swells, proliferates, and in places blocks the small vessel. In a few cases the spirochaetes may also be found in the interior of the vessels.

They are also found in the neighbourhood and the interior of the lymph spaces and lymphatics.

It frequently happens in examining sections of chancres that one fails to find any specific spirochaetes at all, while other sections taken from the same block may show them in large numbers. This is due to the irregular distribution of the parasites, which often occur in masses situated in dilated lymph spaces.

With regard to their relation to the cells themselves, Ehrmann⁶² detected spirochaetes which had been enclosed by fibroblasts, by polynuclear leucocytes, as well as by endothelial cells. That phagocytosis had occurred, and the appearance was not simply due to superimposition of the parasite on the cell, was shown by the evidences of degeneration which the organisms showed, an appearance which does not occur in those which are evidently free. These results had been confirmed by Hoffmann.

In the lymphatic glands, according to Hoffmann and Beer,⁶³ the spirochaetes are found lying along the connective-tissue fibres of the trabeculae and in the lymphatic channels. The distribution of the organism with regard to the vessels, and their effects on the vascular endothelium, are much the same as in primary lesions, and there is the same infiltration of the tissue with mononuclear and plasma cells. As may be expected, attempts to obtain the spirochaetes by means of gland puncture are by no means

so successful as by scarification of the primary lesion. In fact, they appear to be comparatively scanty in this situation, probably, as Levaditi and Roché say, because here they are face to face with strong defensive agencies. It is interesting to note that they have been obtained from glands far removed from those which are connected with the primary lesion.

In skin and mucous membrane lesions, condylomata and mucous patches are very rich sources of *Spirochaete pallida*. In roseolar and macular rashes they are by no means so frequently found, and the literature is very full of failures to discover them in these lesions, though Flexner⁶⁴ and a few others report successes in some cases. From papules and pustules they can be more easily obtained, either by the method recommended by Levaditi and Petresco,⁶⁵ of applying a small blister to the area, or perhaps more easily, by scarifying the area and using some form of cupping arrangement.

Examination of the portion of affected skin after excising and staining it by the silver method shows the spirochaete somewhat irregularly distributed (often in clumps) between the cells of the Malpighian layer and amongst the mononuclear cells, which infiltrate the perivascular tissue of the papillary vessels. Levaditi and Manouélian⁶⁶ have also found them scantily inside the papillary vessels. From practically every other secondary lesion these spirochaetes have been recovered, sometimes in large numbers, sometimes scantily.

In tertiary lesions a close parallelism is again seen between their slight contagiousness and the difficulty in discovering spirochaetes in them. Observations of workers in this direction have been attended by negative results for the most part, but Spitzer⁶⁷ was able to demonstrate the micro-organisms in a case showing ulceration of nose and ears, and in another suffering from ulcerating gummata of the scalp. Tomaczewski⁶⁸ examined film preparations from ten cases of tertiary syphilis, and, after searches which frequently lasted many hours, discovered the parasite in three cases of serpiginous ulceration and two of gummata. In sections of gummata Doutrelepont and Grouven⁶⁹ found a few spirochaetes round a neighbouring vessel.

It appears to have been mostly in the periphery of these tertiary lesions that the spirochaete has been discovered, and in this connexion it is interesting to recall Finger and Landsteiner's method of demonstrating the infectivity of tertiary lesions by inoculation with tissue from the periphery.

The relationship of *Spirochaete pallida* to tertiary lesions is not yet decided. In spite of the fact that these micro-organisms are scanty, as shown by microscopic and experimental evidence, very profound changes occur, and this apparent disproportion between cause and effect has been used as a strong argument against the aetiological rôle of *Spirochaete pallida* in syphilis. Assuming that *Spirochaete pallida* is the cause of syphilis, it is possible, as Sir William Leishman⁷⁰ remarks, that the parasites have assumed a resting stage, or that the lesion is due to the past action of the spirochaetes or their toxins, the former having disappeared by the time the lesion is recognizable clinically. This latter possibility would be quite analogous to what occurs in sleeping sickness, in the last stage of which the trypanosomes cannot be found in the brain, though the latter shows the most profound changes.

Another explanation might be afforded by Finger and Landsteiner's experiments (to be referred to later), in which inoculation of a person suffering from tertiary syphilis with new syphilitic virus produced a lesion of similar character to that from which the inoculated person was suffering ; indicating that a peculiarity in the reaction of the tissues to the spirochaetes had developed with the lapse of years.

In cases of rupia and those showing severe ulceration it is difficult to find the spirochaete. One would expect this when recalling the rarity with which it is recovered from the central ulcerated area of primary sores.

In internal organs the spirochaete has been discovered in the periphery of gummata of the liver. It is interesting, in connexion with the aetiology of lesions of the aorta, to note that the spirochaete has been found in the internal coat, amongst the connective tissue fibres or in the lymph spaces (Reuter⁷¹), and in the outer coat (Benda⁷²) of this artery. In other organs, with the exception of the suprarenal capsules, it has not been demonstrated micro-

scopically in acquired syphilis, though the virulence of the haemopoietic organs and testicle of syphilized monkeys indicates that it must exist in some form or other in these organs. It has rarely been demonstrated in the blood, but, using some means of haemolysis (water or acetic acid), and taking a fair quantity which has been centrifuged after lysis, a few successes have been recorded. In semen, notwithstanding Finger and Landsteiner's experiments which prove the virulence of this fluid on occasion, it has not been discovered.

In urine it has been demonstrated by MacLennan,⁷³ amongst a few others, in cases which, for the most part, were suffering from albuminuria at the time of the examination.

IN CONGENITAL SYPHILIS

In contrast to the rarity with which it has been encountered in the organs of adult syphilitics, the spirochaete literally swarms in the offspring of syphilitic parents who are still-born or have survived their birth a very short time in consequence of this disease. It would be impossible to enter into the character of their distribution or the histological changes to which they give rise in any detail in the present article, and one can only indicate the main features. For further details, an excellent account is given in the first volume of the present work.

It will be remembered that the original discovery of the *Spirochaete pallida* was quickly followed by the work of Buschke and Fischer, who demonstrated the micro-organism in the liver and spleen of a new-born infant dead of hereditary syphilis, while Levaditi found them in the pemphigus bullae of syphilitic infants. Since then, thanks largely to the silver method of staining, a very considerable amount of work has been done on the subject. They have been demonstrated in practically every organ of the body ; in the placenta and cord, the peripheral blood, the liver, stomach and spleen, bone marrow, mesenteric glands, suprarenal glands, thymus and thyroid, the kidney and bladder, in the brain and cerebro-spinal fluid, and in the uterus, ovaries, Graafian follicles, and even in the ovocytes⁷⁴ themselves, as well as in the testicles. An important point is their frequent abundance in the secretion

from skin and mucous membrane lesions, and they have been demonstrated in, amongst others, the nasal mucus, the bronchial secretion, pus from the conjunctiva, the meconium (see Plate VI), and urine. It will be seen, therefore, how very dangerous an infant suffering from hereditary syphilis frequently is. While their presence has been noted in practically every organ and secretion of the body in congenital syphilis, their distribution in these is by no means equally abundant. Of all the organs, the liver appears to contain the most, and it is no exaggeration to say that in some cases it appears to be literally stuffed with the parasites. The distribution of the spirochaetes with regard to the histological elements is very much the same as in acquired syphilis; they are found in the perivascular tissue and around the lymphatics as well as occasionally inside the vessels, and also enclosed in the secretory cells of the liver and other organs. This enormous prevalence of *Spirochaete pallida* in the tissue of hereditarily syphilitic infants is a powerful factor in its indictment as the cause of syphilis.

A question of great interest, and one on which some light has been thrown by means of the silver method of staining the tissues, is the manner in which hereditary syphilis is transmitted to the infant. It is generally recognized that infection of the child may result from disease of either or both parents. Infection from the mother may be explained by transmission of the parasites via the placenta and cord, and this is supported by their enormous prevalence in the liver, the first organ, it will be remembered, to receive the placental blood.

Can hereditary syphilis occur by infection of the ovum itself, whether by spirochaetes circulating in the blood of the mother or carried with the semen? This is a question on which only indirect evidence is at present available. Regarding maternal infection of the ovum, we have the finding of the spirochaetes in the apparently healthy ovocytes of hereditarily syphilitic infants, and, in spite of the fact that they have not been found in the ova of adult syphilitics—a fact possibly explicable by the small number of examinations of such subjects which have been possible—it is conceivable that an ovum may be infected by a single spirochaete, the presence of which it tolerates, that the ovum is subsequently

fertilized and develops, and that then the parasite, finding sufficient nutriment available, begins to multiply in the organs of the foetus. Paternal infection of the ovum is a possibility which rests on the experiments of Finger and Landsteiner, which prove that the semen can contain the virus. It will be remembered that monkeys were infected by semen from a case of secondary syphilis which showed no signs of testicular disease, as well as from a case of syphilitic orchitis. It is not necessary for the argument in favour of paternal infection of the ovum that the spirochaete should penetrate the head of the spermatozoon; the chemiotactic activities of *Spirochaete pallida* are not necessarily those of the spermatozoon, and even if the ovum be already fertilized it need not therefore be resistant to penetration of the spirochaete. Another question of great interest is that of delayed manifestations of hereditary syphilis. It is well known that, generally speaking, the longer the period which has elapsed since the infection of the parent or parents, the later the manifestations in the offspring.

The researches of Levaditi and Manouélian and others have demonstrated that the tissues of the foetus offer a marked resistance to the spirochaete, as shown by the evidence of phagocytosis which occurs, and the reaction of the organs to the infection (cirrhosis of liver and white pneumonia), and it would seem to be largely a question of dosage as in other infections. One can conceive of the parasite circulating in steadily decreasing numbers in the blood of the mother as time elapses from the date of infection; till the time comes when the embryo is dosed with a number, which by a strong reaction on the part of some of its organs (notably its liver) it can confine to these organs; the body is not overwhelmed, and the infant is born alive to show manifestations weeks later. Finally, that a still smaller dose enters the foetal circulation, and this is still more effectually dealt with. Levaditi and Roché,⁷⁵ relying on the work of Gierke⁷⁶ and others which demonstrated the power of the *Spirochaete pallida* to penetrate glandular cells, consider it probable that it is capable of remaining latent for long periods in the secretory cells of the liver, protected from the attack of the defensive agencies of the body.

CHAPTER XIV

PROBLEMS OF IMMUNITY AND PROPHYLAXIS

THE possibility of producing a second chancre by inoculation with syphilitic virus after a primary sore has appeared is a question on which a considerable amount of work has been done from the earliest times. The earliest investigations established that after the appearance of the chancre inoculation with syphilitic virus failed to produce any lesion. These results, though confirmed in the main by later workers, had to be somewhat modified, and it was then shown that if the inoculation were practised at a sufficiently early date, it was possible to produce a second chancre in the same individual. Queyrat⁷⁷ showed that this could be done if the re-inoculation were practised within ten days of the appearance of the first chancre. At the same time the effect of the second inoculation is considerably modified according to the period at which the latter is practised; thus the incubation period becomes shorter and shorter and the resulting chancre more evanescent and atypical as the age of the primary lesion advances.

Re-infection with production of a second primary lesion during the secondary and tertiary periods of the disease is extremely rare. This apparent immunity to re-infection from outside sources is analogous to that which occurs in certain protozoal infections, such as piroplasmosis and trypanosomiasis (Levaditi and Roché). As these authors point out, one should speak of this so-called immunity rather as a refractory state of the skin to infection by spirochaetes from external sources than as absolute immunity, because during the periods in which freshly introduced virus fails to produce a lesion we know that the spirochaetes circulating in the patient's blood can cause the most extensive skin lesions. Finger and Landsteiner⁷⁸ do not consider that the

skin is immune to re-infection from outside sources at any period of the disease. By their method of introducing a large quantity of virus into sub-epidermic pockets, they have shown that it is possible to produce cutaneous manifestations at the site of re-inoculation in the secondary and tertiary stages. In the secondary period, by introducing fragments of chancre, they produced at the site of inoculation, after fourteen days' incubation, papules which became scaly and even scabbed, persisted for some weeks, and then healed, leaving pigmented scars. In cases suffering from tertiary lesions, inoculation with chancre material or virus from secondary cases produced lesions resembling the particular type of manifestations which the inoculated person happened to be displaying—cutaneous tubercles, gummata, ulcerating syphilides. Control experiments were performed with material, the virus of which had been killed, and these failed to produce any lesion ; showing that the reaction which happened after inoculation with living virus was due to activity of the newly introduced and not to the parasite already established in the tissues. These experiments, if confirmed, would appear to show that tertiary manifestations are due to a special reaction of the body tissues to the virus, which has developed with the lapse of time, rather than to the action of developmental forms of *Spirochaete pallida*.

VACCINATION

Experiments in this direction have not, so far, been sufficiently conclusive to warrant the adoption of any practical means of vaccination applicable to the prevention of syphilis in man. Experiments on anthropoid apes by means of virus which has been filtered, killed by heat, or destroyed by other physical or chemical agencies have in the hands of Metchnikoff and Roux, Neisser, Finger and Landsteiner, failed to produce any immunity.

On the other hand, experiments with living virus which has been modified by passage through anthropoid or inferior apes, have been attended by results which justify a hope that possibly the solution of the difficulty may eventually lie in this direction. Metchnikoff and Roux⁷⁹ found that after passage through a *Macacus sinicus*, a virus, which had been originally obtained from

man, appeared to have lost its virulence for a chimpanzee, seeing that inoculation with it produced a very fleeting primary lesion and no further symptoms. These workers continued their investigations and, by a series of twenty-two passages through *Macacus rhesus*, again established that the virus underwent considerable modifications; the incubation period, at first nineteen days, became shortened to seven, and the activity of the parasite appeared to become specialized to the *Macacus rhesus*, as its inoculation into a chimpanzee failed to produce any lesion at all.⁸⁰

An experiment on a human being appeared to confirm the inference drawn from these results. In 1905 the same workers inoculated into a man aged 69, a chimpanzee, and a *Macacus sinicus*, a living virus which had been passed several times through different monkeys. The chimpanzee developed a typical chancre after an incubation period of twenty-three days, and this was followed by general enlargement of glands. The maeaque suffered from a small chancre which rapidly healed, while the man, after twelve days, showed in two out of the three sites of inoculation a dark red papule which did not indurate and healed rapidly. No other signs appeared during a year following the inoculation.⁸¹ Unfortunately the general application to man of a method of prophylaxis which is suggested by the results of these experiments, is hedged round by many difficulties which will be appreciated when it is remembered for what prolonged periods the virus of syphilis can lie latent, and yet how serious may be its subsequent effects.

Another method proposed by Kraus,⁸² which has not received much support on account of the inconclusive results which have been obtained by it, is to inoculate with increasing doses of a virus which has been killed with carbolic acid, as soon after the appearance of the primary sore as possible.

The *serum therapy* of syphilis has so far not been productive of any important result.

Prophylaxis. The effect of mercurial preparations on primary sores has been well known for a very long time, and one has only to observe the result of an examination for spirochaetes in a primary sore before and after the application of ordinary blue

ointment to be convinced of the extraordinary rapidity with which these organisms seem to disappear from the sore under the influence of a dressing of this nature.

Metchnikoff and Roux made a series of investigations culminating in an experiment on man, which indicate that in mercurial ointments we have a very valuable means of prophylaxis. The final experiment was made on a student in his last year of study, who had never suffered from syphilis. He was inoculated in two places from two chancres, one nine days, the other a month old, and at the same time four macaques were inoculated from the same sources. After an hour, the student and one of the monkeys were rubbed at the sites of inoculation with 30 per cent. calomel ointment. A second macaque was rubbed in the same way twenty hours later, while the other two, which served as controls, were not rubbed at all. The two controls and the macaque rubbed twenty hours after inoculation developed chancre in which *Spirochaete pallida* was demonstrated, while the student developed a crop of herpes, which appeared directly after the rubbing, and healed in two days. No other symptom had appeared more than a year later. The macaque rubbed at the same time similarly showed no symptoms. Further experiments on monkeys appear to show that simple application of the ointment is equally efficacious. The ointment now recommended by Metchnikoff and Roux for purposes of prophylaxis has the following composition :—

Calomel, 33 parts.

Lanoline, 67 „

Vaseline, 10 „

Neisser has obtained similar results with carbolic acid, corrosive sublimate, silver nitrate, and even by washing with plain water, but the conclusive experiments with the simple and convenient ointment first mentioned should recommend its use in preference to others, which are less easily handled by inexperienced persons.

Naturally the usual conditions of infection with syphilis do not generally lend themselves to application of this ointment with the same precision and regard for time as was observed in the above experiments, and attention has been turned towards

the production of a prophylactic which can be applied when lapse of time, so inimical to the success of local applications, has perchance effected the production of calmer reflection, and in this respect the use of atoxyl has been encouraging. Metchnikoff, Roux, and Salmon⁸³ by many experiments have shown that small doses of atoxyl can prevent chancre ; e.g. 0.15 gm. atoxyl injected into a monkey fifteen days after inoculation prevented the appearance of a chancre. The animals in which these effects were produced were proved by subsequent inoculation to be fully susceptible to the virus, showing that the initial infection had been entirely aborted.

CHAPTER XV

TECHNIQUE FOR THE DEMONSTRATION OF *SPIROCHAETE PALLIDA*

THE *Spirochaete pallida* may be demonstrated in the living condition, in stained films, and in sections. In the living condition it may be seen in hanging-drop preparations by using axial light, and this was in fact the method originally adopted by Schaudinn for its demonstration. This method, however, requires the best optical conditions, with considerable training on the part of the observer, and both of these are not always available, so that altogether the method is now only of academic interest.

Fortunately there is another way in which the spirochaetes can be easily demonstrated in the living condition, and as it is for all clinical purposes the simplest, the most certain, and the most rapid, it deserves a somewhat detailed description.

Owing to the difficulties which attended the examination for spirochaetes by the ordinary methods, Landsteiner and Mucha⁸⁴ were led to adopt the principles of Siedentopf and Zigmondy's method for the demonstration of colloid particles in liquids.

This procedure has since been confirmed by Hoffmann and other noted syphilologists, and the necessary apparatus, which is now made in a very convenient and inexpensive form, should form part of the equipment of every worker on this subject. Briefly, the principle of the method consists in the illumination of the objects under examination with very oblique rays, while the fluid in which they are suspended transmits no rays to the microscope, and gives a dark or intensely black background.

This may be accomplished in several ways, but probably the most convenient is by fixing in place of the ordinary sub-stage condenser, which is temporarily removed, a special reflecting

condenser, in which the central rays from the microscope mirror are stopped by a circular disc, while the peripheral rays are reflected either from a paraboloidal surface (Fig. 1), as in the case of the Zeiss pattern, or from two hemispherical surfaces, as in the Leitz pattern of dark-ground reflector (Fig. 2). These rays pass through immersion oil, which fills the space between the microscope slide and condenser, and come to a focus at a wide angle on the upper surface of the slide.

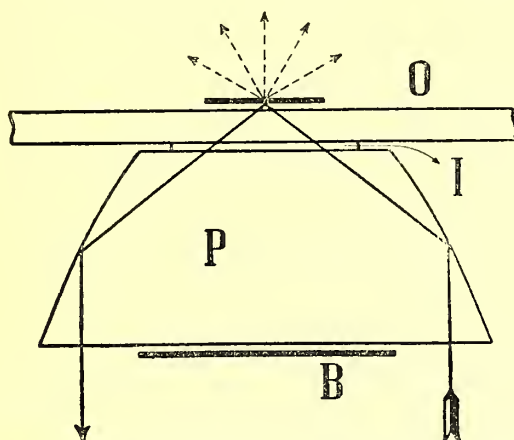


FIG. 11. Diagram illustrating the path of rays reflected from a paraboloidal reflector (Zeiss). P, a plano-convex piece of glass, the convex surface of which is a rotation paraboloid; B, a circular disc, silvered on its under surface, which stops out all the rays from the mirror, with an aperture of from fig. to 1.1; I, immersion oil between the top of the reflector and the microscope slide, O. The peripheral rays from the sub-stage mirror are reflected from the convex surface of P, and pass through the immersion oil I and the slide O to the upper surface of the latter. The rays diffracted by the objects in the specimen are represented by the dotted lines.

Such of the rays as are not diffracted by any object in their path strike the coverslip so obliquely that in cases where a dry objective is being used (and there is consequently air above the coverslip) they are reflected from the surface of the coverslip (Plate III). When an oil-immersion objective is being used, however, these oblique rays, entering a medium of the same refractive index as the glass, pass on and would be transmitted to the eye by any objective with a numerical aperture of more than 1.0, so that the background would be illuminated. Consequently, when an oil-immersion lens is used, it is necessary to cut down its

numerical aperture. This is readily accomplished by inserting a funnel stop, which acts by curtailing the diameter of the back lens of the objective. The stop can be removed in an instant when the objective is required for ordinary purposes.

In these ways the dark background is produced. Any rays which are diffracted by objects in their path, organisms, blood cells, &c., in the specimen are so bent that they are taken up by the objective, and are consequently represented as brightly illuminated images of those objects.

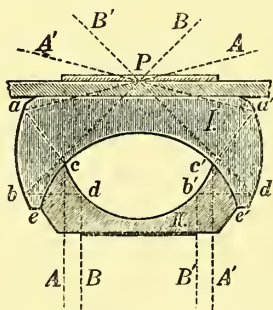


FIG. 12. Diagram illustrating the path of rays reflected from a hemispherical reflector (Leitz). I and II are two glass bodies joined together on the hemispherical surface $ecc'e'$ to form a single spherical surface $aba'd'$. The thick black line between B and B' is a stop to cut out the central rays from the mirror. The unstopped rays $ABB'A'$ strike the inner spherical surface at $cdb'c'$ and are reflected from these points to the outer surface, which they strike at the points $abd'a'$ respectively, and are again reflected to come to a focus at the point P on the upper surface of the microscope slide.

A dry objective, 4 mm. or 3 mm. apochromat, with compensating eye-piece $\times 8$ or $\times 12$ has been usually recommended for use with the dark-ground condenser, but high-power dry objectives have some disadvantages which will be appreciated by those who do not work with every convenience to hand. Chief amongst these are that they require a special thickness of coverslip, unless provided with a correction collar (an addition which considerably increases their cost), and it is necessary to obtain an objective which is very superior to the dry lens usually considered suitable for routine work. The advantages of the combination of a $\frac{1}{12}$ " oil-immersion objective with No. 4 eye-piece are that, within limits, it does not require a special thickness of coverslip, and a special objective is not required, all that is necessary being to

obtain a funnel stop with which to cut down the numerical aperture of the $\frac{1}{2}$ " objective in ordinary use.

For the rest, a good source of illumination is required, and a bull's-eye condenser, though the latter may be dispensed with if the illumination is sufficiently intense. The best illuminants are: sunlight with a heliostat, arc light, Nernst projector (H pattern), ordinary Nernst with the globe removed, gas-light with inverted incandescent mantle, and some form of petrol vapour lamp. The last named is now made in a very convenient form,

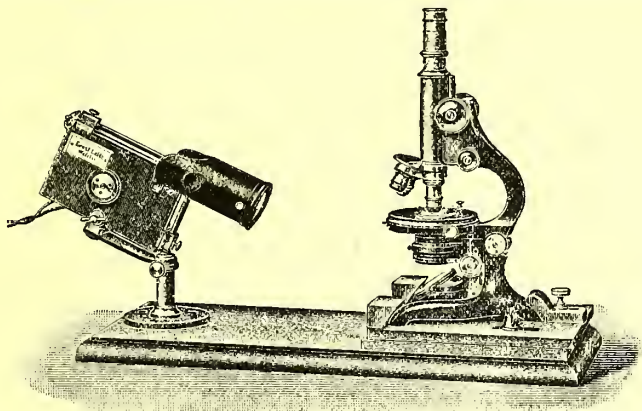


FIG. 13. Illustrating a convenient arrangement of illuminant and microscope for dark-ground illumination. The lamp is an arc and the bull's-eye condenser is permanently fixed at its proper working distance in the metal sleeve of the lamp.

and gives quite a satisfactory light. Its advantages will be appreciated by those who work where electricity and gas are not available.

It is necessary to centre the condenser accurately to the objective. In the Leitz pattern there is a faint ring scratched on the upper surface of the condenser, and the latter is provided with centring screws. The ring is brought into the focus of a $\frac{2}{3}$ " objective and a low eye-piece, and is worked into the centre of the field by means of the centring screws.

The Zeiss pattern should be concentric with the sleeve of the ordinary condenser, and if the latter centres accurately with the objective (as it should) the dark-ground reflector will also be centred.

This centring is highly important for successful illumination, and inattention to it generally results in failure to obtain a good image.

The specimens are obtained and set up for dark-ground illumination as follows :—

Select a slide of the thickness recommended for use with the particular dark-ground reflector fitted, a thin coverslip (of the special thickness recommended if a high-power dry objective without correction collar is being used), and clean both well.

Place the coverslip close at hand, grasped in a pair of Cornet forceps, and gently scrape the *margin* of the previously cleaned sore with the edge of a scarifier, so as to remove the superficial epithelium. Avoid causing haemorrhage as far as possible, though it is necessary to expose the deeper parts of the sore. If blood oozes rather freely dab it lightly with cotton-wool or lint, and wait a minute or so for the clot to form. Then take the coverslip, held in the Cornet forceps, and touch the drop of serum which has oozed out. If it appears that the drop is not sufficient to fill the space between the coverslip and slide, or if it appears to contain many blood cells, it is necessary to add some diluent. For this Gastou and Commandon⁸⁵ recommend distilled water, on the ground that it lyses the blood and causes the spirochaetes to swell up and become more easily visible. Others recommend physiological salt solution (0·9 per cent.). Personally, I prefer a 0·6 per cent. salt solution, as it just preserves the contours of the red cells; and these are useful for obtaining a rapid focus, especially when using a dry objective with correction collar, and a coverslip of somewhat uncertain thickness.

In the case of a condyloma or mucous patch, the surface is scarified in the same way. These are exceedingly rich in spirochaetes.

In a papular rash a good plan is to remove the epidermis by scarification of the papule and then to apply a Bier's glass, or, failing this, the mouth of a test-tube, the blind end of which has been well heated, and the lips smeared with vaseline. From a gland the material is best obtained by puncturing with a fairly stout syringe needle and exerting strong suction with an all-glass

syringe. The material is forced into a watch-glass and emulsified with saline or distilled water, or if clear serum can be obtained, this is taken.

Having by these means obtained a drop of sufficient size on the coverslip, the latter is dropped gently on the slide, so as to allow the drop to flow evenly between. A very thin film is necessary, it being remembered that the focus of the dark-ground reflector is on the upper surface of the slide and the angle at which the rays meet very wide, so that the focus is very sharp. For this the following plan, recommended by Bayly,⁸⁶ is excellent :—Place a piece of lint (or filter-paper) on the thigh or knee, turn the slide over, and press it firmly down on the lint with the coverslip down. The excess fluid will be forced out from between the coverslip and slide, and be taken up by the lint. Having obtained a thin film in this manner, ring the coverslip with vaseline to prevent evaporation. The slide is placed on the stage in such a manner that a layer of immersion oil fills the space between it and the condenser. This is most conveniently done by turning the slide over, dropping sufficient oil on its under surface opposite the specimen, and then placing it on the stage with the drop overhanging the condenser which has been slightly lowered. The condenser is then racked up to the top and, meeting the oil, the latter of course flows between the slide and condenser, filling up the space between. It is highly important to see that this oil contains no air-bubbles. An exceedingly small bubble in or near the area of observation will destroy the dark-ground effect by reflecting light from its surface into the field. The arrangement of the light depends largely on circumstances, but the principle is to place the light and bull's-eye condenser so that the microscope mirror is completely filled with as bright a light as possible. The best guide to this is a piece of paper held across the mirror, on which the image of the flame is seen. The light and bull's-eye are moved about till this is brilliantly illuminated over an area equal to that of the mirror or more. The plane mirror is used, and on moving this about, a bright spot or area appears in the centre of the coverglass. The illumination is then sufficiently good to obtain a view of the image, which can be brought

to its best by slight manipulation of the mirror and focusing arrangements while examining the specimen in the usual way.

The *Spirochaete pallida* seen under these conditions appears as a delicate silvery spiral with the characters mentioned. I have described this method of observation with some detail because I believe it to be the best and most practicable means of making a diagnosis in the primary stage of the disease. While staining methods are useful from the point of view of observing minute details, and should never be neglected, they require the exercise of some skill and patience, and where time is of importance, as in a busy clinique, the dark-ground illumination will be found to be preferable for routine diagnostic work. At the same time, it is necessary to warn against a too rapid diagnosis being made, possibly from an imperfect view and inattention to details of morphology. It must be remembered that the organisms are moving, and it is necessary to scrutinize their characteristics very carefully. The finer forms of *Spirochaete balanitidis* have a superficial resemblance to *pallida*, and, though the mistake does not happen when the observer has the appearances of the true organism well fixed in his mind, I have often seen *Spirochaete balanitidis* mistaken at first for *pallida* by workers who have considerable experience in microscopy. If care be taken to obtain material only from the depths of the sore and to fix the classical appearances well in mind once and for all, no further difficulty should arise. It is far better to return a negative result than to make a positive diagnosis if absolutely typical *Spirochaete pallida* is not seen (Plates IV and V).

STAINING OF FILMS

Now that it has been discovered and its staining affinities studied, it is not difficult to realize how the spirochaete remained undiscovered for so long; as a matter of fact, until after the somewhat recent introduction of the various modifications of Romanowsky's stain. It has a very feeble affinity for the ordinary basic dyes, and though it may be stained by the more powerful of these, e. g. carbol-fuchsin, deposit of the stain is here so excessive that it is often difficult to say which is deposit and which spiro-

chaete. Of the modifications of the Romanowsky's stain the one used by Schaudinn and Hoffmann was Giemsa's, but others, notably Leishman's stain and Marino's, work equally well in the hands of those accustomed to their use.

These undoubtedly give the best results, though for demonstration of flagella satisfactory results are claimed for such flagellar stains as Loeffler's and Van Ermenghen's. It is necessary for the obtaining of good results with any method of staining that certain precautions be very scrupulously observed.

The slide or coverslip must be perfectly clean and free from grease. Probably the simplest method of attaining this is to polish well and pass the slide thirty or forty times through the flame of a Bunsen burner (Leishman).⁸⁷

The film must be as thin as possible. If the material for examination be fluid, it may be spread in the same way as an ordinary blood film, while more solid material may be lightly rubbed over the slide. Thick films interfere with the staining of the spirochaete and favour deposit, a condition difficult to avoid even under the best possible conditions.

The material is collected in the same manner as described under dark-ground illumination. It is especially necessary in this case to obtain the material from the place where the spirochaetes most abound, viz. the *deeper* epithelium of the indurated *margin* of the sore, and to avoid the presence of blood as far as possible, for, unlike the case in dark-ground illumination, the obtaining of only a few spirochaetes in the film generally means failure to discover them.

Giemsa's stain is very difficult to prepare, and it is best to obtain the solution already made up from some dealer in microscopic accessories.

Its formula is as follows :—

Azur II eosin	3 gm.
Azur II	0·8 „
Glycerine (Merck, chemically pure) . .	250 „
Methyl alcohol (Kahlbaum. l.) . . .	250 „

After being allowed to dry in air, the films are fixed for fifteen

to thirty minutes in absolute alcohol, or in the manner recommended by Hoffmann and Halle,⁸⁸ which is as follows :—The cleansed slides are placed over a mixture of 5 c.c. of 1 per cent. osmic acid, to which ten drops of glacial acetic acid have been added, and the whole covered over to prevent the dissipation of the osmic acid vapour. After exposure for two minutes, the slides are spread with the material for examination, and, before the latter is dry, are again exposed for two minutes to the osmic acid vapour, allowed to dry, and treated for about a minute with very weak solution of potassium permanganate, washed with water and allowed to dry.

The stain is diluted in the proportion of one drop of stain to 1 c.c. of distilled water, poured over the film and allowed to act for from one to several hours. The longer period is recommended for the best results. If the shorter period is used, it is advisable to use Giemsa's new method,⁸⁹ in which the stain is diluted by adding it to distilled water, to which a solution of sodium carbonate (1 in 1,000) has been added in the proportion of five to ten drops (of the sodium carbonate solution) to 10 c.c. water. Preis's⁹⁰ method is more rapid than either of the above, and gives very satisfactory results. As modified by Giemsa,⁹¹ it is as follows :—The preparation is allowed to dry on a slide, and is fixed by passing three times through the flame. If the preparation is old, no previous fixation at all is required.

The stain is prepared by mixing ten to fifteen drops of Giemsa's stain, drop by drop, with gentle agitation between the drops, with 10 c.c. distilled water, to which five to ten drops of 1 in 1,000 sodium carbonate solution have been added. When well mixed, the diluted stain is poured over the slide, which is then held over a flame for a few seconds, till steam arises (boiling should be avoided); the stain is then poured off, replaced by fresh stain, and the operation repeated; this is done a third time, and the stain is now allowed to act for a few minutes.

The slide is then washed with water, blotted and examined. The author finds it an advantage to examine the slide with a $\frac{2}{3}$ " objective, to see if the red cells have taken the stain well. If not, it is well to repeat the whole procedure. In the final

examination it appears to be of some advantage to search for red cells with the $\frac{2}{3}$ " objective, or some such power, before commencing the search for spirochaetes with the high-power objective. The above methods give very clear results, but, with the exception of Preis's modification, they take a long time, and often, in spite of the greatest precautions, a considerable amount of deposit forms on the films, which it is impossible to remove without decolorizing the spirochaetes.

Leishman's stain appears to have some advantages in these respects, and, in addition, it is probably more accessible to the readers of this volume.

The stain may be used in three ways, and the following are Sir William Leishman's⁹² instructions for the use of his stain in each of these ways, with his own comments:—

1. The procedure described for ordinary blood-staining may be used, if the time is increased from 5 min. to 30 min. In this method fixation of the film is carried out by the action of the stain and double the quantity of distilled water is added to the stain after 30 seconds, the two fluids being well mixed with the help of a needle passed backwards and forwards through the stain. The stain is then washed off in a little distilled water, the film blotted with cigarette paper, dried in the air and mounted in balsam.

2. In this the 'serum method', which is employed for the production of chromatin staining in sections, is applied to the staining of films. The film, prepared with the precautions advocated above, is fixed with methyl alcohol for half a minute; this is blotted off with cigarette paper (which will be found much better than filter-paper) and a thin layer of fresh blood serum is run over the surface of the film. The serum may be obtained from blood drawn from one's finger in the same way in which a sample is collected for the agglutination test. One drop only is required and is drawn over the film with the help of a needle. The excess is then removed by allowing the slide to remain on its end for a few minutes, when the drop which has drained to the end of the slide is wiped off. The film is then allowed to dry in the air. When dry, the staining fluid is prepared by mixing, in a clean watch-glass, an equal number of drops of Leishman's stain and distilled water. The mixture of stain and water is now poured on the prepared film and allowed to act for 25 min., at the end of which time it is washed off in a gentle stream of distilled water, the film blotted as before, dried and examined, either directly in a drop of cedar oil or after being mounted in balsam. The action of the blood serum is twofold; it intensifies the action of the stain and it obviates the dangers of the preparation being spoilt by the occurrence of deposit. The staining, in a successful preparation, should be carried to such a degree that the nuclei of any cells that may be present should appear almost black. If this is the case, there will be little difficulty in detecting the spirochaetes, which will be seen to be sharply stained and easily recognizable with an ordinary twelfth-inch immersion lens.

3. As a third alternative, I have recently found good results from employing

my stain without previous fixation of the film. The method is similar to that which I advocated some time ago for the staining of malarial parasites. In this case the stain and water, in the usual proportion of two parts of water to one of stain (which will be found to be contained in about the same number of drops), are mixed beforehand in a watch-glass and poured directly on to the unfixed film. The best staining takes place in about the same time as in method 2, viz. 25 minutes, and the only additional precautions to observe are that the distilled water used for washing off the stain must be employed with great gentleness and that the blotting with cigarette paper must be done by slight pressure and without any rubbing. By this procedure the red cells are, of course, dehaemoglobinized and, in addition, a great deal of detritus is dissolved from the film; the leucocytes and tissue cells remain, and also bacteria as well as the spirochaetes, should any be present. This method appears to me to present the advantage that the greater freedom from débris and extraneous matter makes the detection of the spirochaetes easier. If the precautions mentioned above are observed, there does not appear to me to be any diminution in the number of the spirochaetes, when compared with a fixed film from the same case. On the contrary, owing to the deeper staining of the spirochaetes, they frequently appear to be more numerous than in the fixed films.

Of the three methods described, the last appears to me the best because of the clearer character of the film and because the spirochaetes are much more darkly stained, so that, if they are only present in very small numbers, they are less likely to be missed. In searching the film one must remember that the thinner zones are those in which the spirochaetes are most darkly stained and therefore most easy of detection.

In the author's experience better results have been obtained by Leishman's third method than by any other.

Marino's⁹³ is another modification of Romanowsky's stain, which is very popular in France, but as it is not so generally available to the readers of this volume, the directions for its use, which may be found in Marino's paper, will not be given here.

Stern's⁹⁴ method makes use of the affinity of *Spirochaete pallida* for silver, of which advantage is taken in section staining. The slide, spread with the film, is dried in air and kept for some hours at 37° C. It is then placed in a colourless glass vessel containing 10 per cent. silver nitrate, and kept in a diffuse light. After some hours the film becomes brown, with a metallic appearance. It is then removed. The spirochaetes are stained black or brown. This method has been found to be very successful by Flexner,⁹⁵ who has modified it slightly. Many other methods of staining the spirochaete in films are used, but, for the most part, they appear to cause so much deposit that no useful purpose would be served by detailing them.

For staining the flagella, the method advocated by Borrel and Burnet ⁹⁶ may be used, and is said to give good results. It is really Loeffler's method of staining flagella. The directions are as follows :—

A freshly made mixture consisting of :

Watery solution of tannin, 25 per cent. . . .	10 c.c.
Cold saturated solution of sulphate of iron . .	5 c.c.
Saturated alcoholic solution of fuchsin . . .	1 c.c.

is poured on the film, which has been fixed by heat. The whole is warmed till steam rises, when the mordant is poured off, and the operation repeated three or four times. The slide is then washed with distilled water, and stained with carbol-fuchsin, which is gently heated ; it is then washed, dried, and mounted. The spirochaetes stain a deep red, while the flagella are said to stain a light rose tint.

Another method of demonstrating the spirochaete is Burri's.⁹⁷ In this the serum supposed to contain the parasite is mixed on the slide with Chinese ink, the film is then spread, and, as soon as it is dry, examined in the ordinary way. The ink obscures all the elements in the specimen except the spirochaetes, which it leaves untouched, so that an effect something similar to dark-ground illumination is produced. My experience with this method is that while it demonstrates other spirochaetes, such as *Spirochaete dentium*, pretty well, it does not reproduce the distinctive characteristics of *Spirochaete pallida* sufficiently well to enable one to place reliance on it for diagnostic purposes.

It is essential in examining films stained in any of the above ways that a good oil-immersion objective be used ; a good light is also essential, and the dispositions generally should be such as to bring out the full resolving powers of the microscopical apparatus at one's disposal. The *Spirochaete pallida* is undoubtedly, from its delicacy and its faint staining affinities, a very difficult object to resolve, and optical conditions which are good enough for ordinary bacteriological specimens may easily fail to make this organism distinguishable. (The works of Wright and of Spitta on microscopy are recommended in this connexion.)

It is necessary to search for long periods before one can be at all certain of the absence of the organism.

Staining of Spirochaete pallida in tissues. The discovery of the *Spirochaete pallida* stimulated workers to perfect the methods of staining spirochaetes generally in tissues, which had formerly given good results. Bertarelli, Volpino, and Bovero⁹⁸ first applied Van Ermenghen's flagella stain to this purpose. These workers stained the sections after cutting, but Levaditi⁹⁹ effected a great improvement by his modification of Ramon y Cajal's¹⁰⁰ method of staining nerve-cell terminations. Instead of staining the sections after cutting, the tissues are stained *en bloc* previous to dehydration and embedding. There are now two methods associated with Levaditi's name. The first is recommended for staining the tissues of hereditary syphilitics, while the second, introduced by Levaditi and Manouélian,¹⁰¹ is recommended by those workers more particularly for tissues removed during life (chancres, glands, &c.).

The directions for their use are as follows :—

Levaditi (original for hereditary syphilitic tissue) :—

1. Pieces 1 to 2 mm. thick are fixed for twenty-four hours in 10 per cent. formalin.

2. Harden in alcohol for twenty-four hours.

3. Wash in distilled water till the pieces sink to the bottom.

4. Place in a well-stoppered bottle containing 1·5 to 3 per cent. solution of silver nitrate in distilled water, and keep in the dark at 38° C. for three days.

5. Wash in distilled water.

6. Reduce by placing in the following solution for twenty-four hours :—

Pyrogallie acid	4 grams.
Formalin	5 c.c.
Distilled water	100 c.c.

7. Dehydrate with absolute alcohol, clear with xylol, embed in paraffin, and cut sections in the usual way.

The sections should be as thin as possible (at most 5 μ). They may be mounted directly after removal of the paraffin, or may be counterstained by undiluted Giemsa solution for some minutes,

washed in water and differentiated with absolute alcohol, to which some drops of oil of cloves have been added.

Second method (Levaditi and Manouélian) :—

1. The tissues are fixed in formalin, passed through 96 per cent. alcohol, and washed in distilled water, as in the first method.

2. Impregnate in :—

1 per cent. solution of silver nitrate in distilled water, 90 c.c.

Pyridine (added at moment of use), 10 c.c.

A large volume of the solution should be used in a stoppered bottle, and the tissue kept in it for two hours at the room temperature, and for three to five hours at 50° to 55° C., the time depending on the thickness and permeability of the tissues.

3. Wash in distilled water and reduce in the following bath :—

Pyridine, 17 c.c. (added at moment when used).

Acetone, 10 c.c.

Sol. pyrogallie acid, 4 per cent. (in distilled water), 90 c.c.

(Plate VI).

Reduction occurs after some hours.

4. Dehydrate in alcohol, clear in xylol, and embed in paraffin.

If the specimen be counterstained this should be done either with Unna's polychrome methylene blue, or toluidin blue, followed by differentiation with Unna's glycerine ether.

Both the above methods are quite successful in staining the spirochaetes, which appear as intensely black spirals amongst the yellowish tissue elements.

Ravaut and Ponselle¹⁰² have made use of Levaditi's method for the demonstration of spirochaetes in the blood. The blood is dropped into water, which is then centrifugalized, and the fibrinous clot stained by Levaditi's method as if it were a piece of tissue.

CHAPTER XVI

IDENTIFICATION OF SPIROCHAETES

SCHAUDINN and Hoffmann, in their original account, described two spirochaetes which were constantly present in syphilitic lesions. No confusion should arise between these two, however, as their characters are widely different.

Spirochaete refringens is readily distinguished from *pallida* by its greater thickness and its bold irregular curves, which are comparatively few in number. It always stains much more readily than *pallida*, and as it may become purplish red under the intense staining to which a film suspected of containing *pallida* is always subjected, it assumes a much deeper tint than *pallida*, which generally stains rose-pink under the Romanowsky stains.

Spirochaete refringens is an inhabitant of the surface, particularly of the centre of the sore, and never penetrates, so that, if the directions for obtaining the material be closely followed, very few specimens of *Spirochaete refringens* should be seen in the film.

Certain other spirochaetes, however, occur which resemble *pallida* sufficiently closely to make it necessary that their distinguishing characteristics should be mentioned, so that no confusion may arise.

In lesions of the generative organs it is very common to find spirilla of many gradations of thickness and regularity of curves, from thick irregular forms, which approach *refringens* in type, to fine closely twisted specimens, which might, on superficial examination, be mistaken for *pallida*, especially in fresh specimens. The majority of these, when stained, do not show the regularity of spiral formation which is so marked when they are in the fresh state, so that it is chiefly in examining specimens under the dark-ground illumination that care is necessary. The great majority of these spirilla probably belong to the variety known as *Spiro-*

chaete balanitidis (Hoffmann-Prowazek). Possibly the finest forms which occur belong to the variety lately cultivated by Levaditi and Stanesco,¹⁰³ and named by them *Spirochaete gracilis*. The exact relationship which these varieties bear to one another is by no means clear at present ; whether they are all varieties of *refringens* or belong to different species will be settled by future research. Some workers believe that a number of these irregular forms which seem almost as fine and nearly as regular as *pallida* may possibly be varieties of the latter organism. The author's own experience, after having found such very delicate and closely twisted spirilla in lesions which were certainly not syphilitic, is that it would be extremely unsafe to diagnose an organism which did not conform in all particulars to the characters peculiar to *pallida*, as the latter parasite.

The finest of these varieties can be distinguished from the organism of syphilis by the following characteristics :—

1. In the fresh state they are always thicker, more refringent, more active in movement (especially of progression), and possess spirals which are somewhat broader and shallower than those of *pallida*. The whole impression obtained from a view of even the finest and most regular of these organisms is that in every respect they are coarser than the micro-organism of syphilis.

2. When stained, the regularity of the spiral, which may have caused some doubt when the organism was examined in the fresh condition, is lost, the spirillum is more easily and more intensely stained, and its greater thickness is at once apparent.

In ulcerating new growths Löwenthal¹⁰⁴ and Kiolomenoglou and Cube¹⁰⁵ found certain very delicate spirochaetes which bore a superficial resemblance to *Spirochaete pallida*. Löwenthal described two varieties : (1) *Spirochaete microgirata*, 2.5 to 6 μ long and $\frac{1}{4}$ to $\frac{1}{2}$ μ thick, with 4–12 very steep undulations. This form takes a pale-blue colour when stained by Giemsa's stain. (2) Another form which is distinctly thicker and less regular than *pallida* and stains blue with Giemsa's stain.

Kiolomenoglou and Cube believed that the forms which they had found were identical with the parasite of syphilis. Hoffmann's examination of their specimens very quickly disposed of this

contention, as the organisms were easily distinguishable by their greater thickness, irregularity, and staining affinities. Mulzer's¹⁰⁶ study of the spirochaetes to be found in ulcerating new growths shows that these *pseudo-pallida*, as he calls them, can be distinguished by (1) having shallower, irregular, undulations, (2) taking a blue colour with Giemsa's stain, and, when stained with warm carbol-fuchsin, becoming deep red, in contrast to *pallida*, which stains pale red.

Spirochaete dentium, an inhabitant of carious teeth, is on the whole shorter, slightly thicker, and shallower; the proportion between the width of each undulation and its depth being as 1 : 0·5, while the similar proportion in the case of *pallida* is as 1 : 1·5 or 1 : 1.¹⁰⁷ Though very like the micro-organism of syphilis in its tenuity, and the regularity of its undulations, a few examinations of the spirilla inhabiting carious teeth will show that its identification presents little or no difficulty.

Spirochaete pertenuis of yaws¹⁰⁸ is so extremely like *Spirochaete pallida* that the distinction between the two organisms seems to be almost impossible. Prowazek,¹⁰⁹ who has made a careful study of specimens of *pertenuis*, has laid down the following distinctions for guidance in identifying the two species:—(1) *Spirochaete pertenuis* is slightly thicker than *pallida*, when stained by Loeffler's method, (2) its undulations are neither so steep nor so regular, and a number of deep undulations are succeeded by shallower ones, (3) its extremities are often twisted into rings or loops, and (4) it rarely possesses cilia, or, at most, these are confined to one pole.

Fortunately yaws is a disease which is confined to certain restricted areas, so that one is unlikely to be very often faced with the necessity of establishing these minute differences, and, in any case, the clinical appearances of the two diseases are sufficiently distinct to prevent error. That the two diseases are distinct has been shown by the work of Neisser, Baermann, and Halberstädter,¹¹⁰ who demonstrated that chimpanzees which have recovered from experimental yaws are not immune to syphilis, unlike those which have recovered from experimental syphilis.

CHAPTER XVII

THE SERUM DIAGNOSIS OF SYPHILIS

It is necessary to preface a description of the serum diagnosis of syphilis by a few remarks on immunity in general, in order that a clear understanding of the terms used and of the process which occurs may be obtained.

As is well known, many infectious diseases confer a more or less lasting protection against future attacks of the same disease. Inquiry into the nature of this phenomenon led to an investigation into the changes which occurred in the blood as a consequence of infection by the micro-organisms of these diseases, and it has been found that recovery from infection (whether natural or experimental) is accompanied by the production or increase in the blood serum of what appears to be a whole host of substances which have certain properties when brought into contact with the particular infecting micro-organism. These substances have been given different names according to the phenomena which occur when each is brought into contact with the micro-organisms—e.g. agglutinins, which cause clumping of the specific micro-organisms; bactericidal substances, which kill them; bacteriolytic substances, which dissolve them; opsonins, and others. The whole of these substances are now grouped together under a common name—antibodies. The micro-organisms, which by invasion of the tissues give rise to the production of antibodies, are called ‘antigens’.

The term ‘antigen’ embraces many other bodies besides micro-organisms. Thus toxins, the product of micro-organisms, act as antigens when they give rise to the production of the antibodies called antitoxins; certain vegetable substances, such as ricin and abrin, can act as antigens and cause the production of antiricin, &c.

In general also, it may be said that the tissue-cells of any animal act as antigens when introduced into the body of an animal of another species, and give rise to the production of specific antibodies, i. e. bodies which are antagonistic to the particular foreign cells which have been introduced. *The term 'antigen', therefore, indicates any substance, whether it be organized proteid or otherwise, the introduction of which gives rise to the production of antibodies.*

It is necessary for the purpose in view to describe first the phenomena which occur when the antibodies which have a 'lytic' action are brought into contact with their specific antigens.

The action of 'lytic' bodies was first exemplified by the well-known Pfeiffer's phenomenon. In this, which was the foundation of a great deal of valuable work on the subject of immunity, it will be remembered that when an animal, e. g. a guinea-pig, has been immunized against cholera vibrios by suitable injections of the latter at intervals, the introduction of the vibrios into the peritoneal cavity of the immunized guinea-pig is followed by their becoming motionless, then spherulating, and finally, completely dissolving under the influence of the specific bacteriolysins which have accumulated in the peritoneal amongst other body fluids. The same phenomenon can be observed *in vitro* when a little of the immune animal's fresh serum is added to the cholera germs, and the whole incubated for a short time at 37° C. A similar phenomenon, very pertinent to this subject, occurs as the result of injecting the blood cells of one animal into an animal of another species. In course of time the blood serum of the injected animal acquires the power of dissolving the red blood cells of an animal of the species which provided the cells injected. When the two (serum and blood cells) are put together in a test-tube and kept in an incubator at 37° C. for a short time, the haemoglobin is dissolved out of the red cells and the mixture becomes a transparent red fluid. Within certain limits, this action is specific—i. e. the antibody (in the serum) acts only on the particular antigen (cells) which gave rise to its production: e. g. if a guinea-pig is immunized by injections of the ciliated epithelium of the trachea of an ox, its fresh serum will eventually dissolve

ox trachea ciliated epithelium, but not ox spermatozoa or kidney cells, though, curiously enough, it will dissolve ox red cells.

Further analysis of this property by which the serum of an animal immunized against a particular cell can dissolve that cell *in vitro* at body temperature, has revealed certain very interesting facts of great importance to the present subject, and these may be better illustrated by examples.

If the washed red cells (i.e. red corpuscles freed from serum by repeated centrifugalization and re-suspending in salt solution) of a sheep are injected at suitable intervals and in suitable quantities into the body of a rabbit, whether intravenously, subcutaneously, or intraperitoneally, in course of time the blood serum of the rabbit develops antibodies specific to the antigen used—the sheep's red cells—so that when this rabbit's fresh serum is brought into contact with the red blood cells of a sheep, and the whole incubated at 37° C., haemolysis or solution of the red cells occurs. This occurs, however, only when the serum is fresh and unheated. If the serum be allowed to stand for a number of days (generally over three), it gradually loses its power of dissolving sheep's red cells. Further, if it be heated at 55° C. for half an hour, it loses this power at once.

If such stale or heated serum be put in contact with sheep's red cells and the whole incubated for any time, no release of haemoglobin occurs, and, in fact, apparently no change; one could examine such cells microscopically and detect no difference. A change has occurred, however, as is rapidly shown by adding any fresh serum. If any fresh blood serum, e.g. a guinea-pig's, be added to these sheep cells which have been in contact with the immune rabbit's heated serum (generally referred to as *sensitized cells*), and the whole incubated at 37° C. for an hour, haemolysis occurs. If such fresh normal serum be added to sheep's red cells which have not been in contact with the immune rabbit serum, no solution occurs.

Further, if the guinea-pig serum be allowed to stand for some days, or be heated at 55° C. for half an hour, and then be added to sheep's red cells which have been sensitized by contact with the immune rabbit's heated serum, no further change occurs. It is thus seen

that the immune rabbit's serum in the process of heating or becoming stale loses one property which is necessary for the completion of its action on the sheep cells ; or, in other words, certain molecules in it which are necessary to its complete action are destroyed. It is further seen that on heating or standing it does not lose the whole of its property of dissolving the cells, because addition of any fresh serum, which of itself cannot dissolve sheep cells, results in haemolysis. It is, therefore, legitimate to infer that the substances in it which are destroyed by heat or by standing are also present in every fresh serum. These thermolabile substances are known, from the nature of their action, as *complement* (Ehrlich) ; other names given to the same substances are alexine (Bordet) and cytase (Metchnikoff), but they will be referred to as *complement*.

Those other substances which it will be remembered were still left intact after heating and standing, which could not act of themselves, but whose action was completed by the addition of complement, are known as immune body, *substance sensibilisatrice* (Bordet), or amboceptor (Ehrlich)—names given by different workers according to the conception of each as to its manner of action. Without committing ourselves to any opinion on this question, the name '*amboceptor*' or *antibody* will be used in this instance when referring to them.

If one conceives a given quantity of any serum as containing so many molecules of complement and so many of amboceptor, one obtains a mental picture which assists in the understanding of other points which are necessary to the formation of a clear idea on this subject. In the process of immunizing an animal by the injection of an antigen, do the molecules of amboceptor and of complement both increase in number, or only those of amboceptor ? One can say definitely that, for all practical purposes connected with this subject, only the molecules of amboceptor increase in number.

The question of increase of complement in the process of immunization is a disputed one, but if increase does occur it is so small in comparison with that of amboceptor that it may be neglected here.

An estimate of the amount of amboceptor in a serum is obtained

by a process of titration, an operation much in use in the Wassermann reaction. Supposing that, given the presence of sufficient complement, it required 500 million molecules of amboceptor to cause solution of 1 c.c. of a 5 per cent. suspension of sheep's red cells, and that this quantity of amboceptor were contained in 1 c.c. of heated rabbit serum ten days after an injection of washed sheep's red cells, then 1 c.c. of the heated rabbit serum and sufficient complement would haemolyse 1 c.c. of 5 per cent. sheep's red cells.

After a series of injections it would be found that the number of molecules of amboceptor per cubic centimetre of the rabbit's serum had increased enormously, so that 1 c.c. of the serum might easily contain $2,000 \times 500$ million molecules of amboceptor. $\frac{1}{2000}$ c.c. of this serum would then dissolve 1 c.c. of a 5 per cent. suspension of sheep cells, given sufficient complement, or 1 c.c. of the serum would contain enough molecules of amboceptor to dissolve 2,000 c.c. of the 5 per cent. suspension. Such an occurrence is quite common.

If the complement of the rabbit serum be similarly titrated before and after the process of immunization, it is found that little, if any, increase has occurred in the number of molecules per cubic centimetre. In fact, one would find that normal guinea-pig's serum would be much richer in complement than the immunized rabbit's fresh serum, and would act in smaller quantity with the immune rabbit's amboceptor than would the same rabbit's complement. The amount of amboceptor which, in combination with *excess* of complement, is just sufficient to haemolyse completely 1 c.c. of a 5 per cent. suspension of cells is known as the minimum haemolytic dose of amboceptor, or shortly, one dose, so that if $\frac{1}{2000}$ c.c. of heated immune serum dissolved 1 c.c. of 5 per cent. suspension of sheep's red cells (in presence of excess of complement) then $\frac{1}{2000}$ c.c. would be referred to as four doses of amboceptor.

Similarly in the case of complement ; if $\frac{1}{100}$ c.c. fresh guinea-pig serum were just sufficient to haemolyse 1 c.c. of the 5 per cent. suspension of blood cells, in presence of excess of amboceptor, then $\frac{1}{100}$ c.c. of the same serum would be referred to as ten doses of complement.

Another point to bear in mind is this, that a minimum haemolytic dose of amboceptor will not produce complete lysis of 1 c.c. of a 5 per cent. mixture of cells in combination with a minimum haemolytic dose of complement, and vice versa. On this account, it is usual, when testing for the amount of amboceptor in a given serum, to use ten doses of complement, and similarly, when titrating a fresh serum for complement, two, four, or even eight doses of amboceptor are added.

The relations which the various substances concerned in a lytic process bear to one another are important. If fresh normal guinea-pig serum (i.e. complement) be added to sheep's red cells, and the mixture, after standing at 37° C. for an hour, be then centrifugalized, the supernatant fluid pipetted off, the cells re-suspended in 0.8 per cent. salt solution, and the process repeated several times; or, in other words, if the sheep cells be then washed, and amboceptor (heated immune serum) be added to the washed cells, no visible effect occurs, indicating that the complement did not attach itself to the cells, but remained in the supernatant fluid which was pipetted off.

But if, on the other hand, heated immune serum (amboceptor) be added to the cells, and, after allowing time (an hour) for combination, the cells be washed and, finally, complement be added, haemolysis occurs. This indicates that the amboceptor did attach itself to the cells and could not be removed by the subsequent washing.

Both experiments combine to show clearly that the antigen (the red cells) would not fix the amount of complement necessary for haemolysis till it had been acted upon (sensitized) by its specific antibody (the heated immune serum).

The process is graphically represented by Ehrlich, and, though one may not agree with his conception of the process in detail, it serves to form a helpful mental picture of what occurs. According to Ehrlich, the cell has a process or group with an affinity for the amboceptor, which thereby becomes attached to it by its special arm. On the other hand, the amboceptor has another arm by which it attaches the complement. The latter is supposed to consist of two parts; one grasps the amboceptor, the other acts

on the cell and dissolves it. Fischer's conception is useful, if taken with the same reservation. The cell is conceived of as a highly superior lock, amboceptor as the very special key which fits that lock, and complement as the hand (any hand) which turns the key and opens the lock. It illustrates the specific nature of amboceptor and the non-specific nature of complement.

From the above it will be now clear that an antigen combines with its specific amboceptor (or antibody), and the combination has the property of attaching to itself complement.

The question arose as to whether complement was specific or not ; in other words, whether the complement which effected bacteriolysis was the same substance as that which effected haemolysis, or were the two different. On the one hand, Ehrlich maintained that they were different, while Bordet held just as strongly that complement was non-specific. Each maintained his point with a long series of experiments of the most ingenious nature, and one of these resulted in the establishment of the Bordet-Gengou¹¹¹ phenomenon, which was designed to show that complement is non-specific, and was the basis on which the Wassermann reaction was founded. It illustrates again the fact that a research in pure science, which appears to the 'practical common-sense' person to be a mere waste of time, frequently leads to results of the utmost practical value.

The Bordet-Gengou phenomenon is as follows :—

If an animal be immunized against a pathogenic micro-organism, e. g. cholera, and if then its heated serum (amboceptor), cholera vibrios (antigen), and fresh normal serum (complement) be put together and incubated at 37° C., the antigen, antibody, and complement will unite, and at the end of the period of incubation no complement will be left free (provided, of course, that no more complement has been added than is sufficient to satisfy the antigen-antibody combination). The proof of this is simple. All that is necessary is to add a reagent which will detect the presence of free complement. Such a reagent will suggest itself from what has been written. It will be remembered that the addition of heated anti-sheep's red-cell serum to sheep's red cells produced no visible effect, but that the further addition

of complement caused haemolysis. Obviously, therefore, if these sensitized cells, as they are called, be added to the cholera vibrio + anticholera serum + complement combination after the necessary incubation, no haemolysis would occur; proving that no free complement was present. But if anticholera serum, typhoid bacilli, and complement were mixed and incubated, and then the reagent (the sensitized cells) added, the case would be different. Anticholera serum is not the specific amboceptor for typhoid bacilli, so no combination of complement would occur, and the sensitized sheep's red cells, added after the first incubation, would be dissolved.

Similarly, supposing the serum of a patient suffering from typhoid fever be taken about the fourteenth day, when it could be expected to contain antibody specific to typhoid bacilli, and divided into three parts, after heating at 55° C. for half an hour to destroy its natural complement, and to one part were added gonococci and complement (fresh guinea-pig serum), to another cholera vibrios and complement, and to the third typhoid bacilli and complement. Then that the whole were incubated for a couple of hours, and the reagent added to each. From the Bordet-Gengou phenomenon, one can predict that haemolysis would occur in the first two, but not in the third tube.

It will thus be seen how the Bordet-Gengou phenomenon can be applied to the testing for the presence of a particular antibody in any blood serum; for the addition of a known antigen to such a serum, together with complement, will demonstrate, by the occurrence or not of deviation (binding) of complement, whether that antigen has found in the serum its corresponding antibody or not.

It was quickly found that the same binding of complement occurred when a serum antigen was put in contact with its corresponding antiserum, and complement added, and the test is an exceedingly delicate one for blood stains.¹¹² Wassermann and Bruck¹¹³ then found that not only micro-organisms but watery extracts of these could be used as antigen, and thereby the phenomenon became a convenient one for demonstrating the presence of antibodies in patients' blood, e.g. in

tubercle, &c. Finally, in 1906, Wassermann, Neisser, and Bruck¹¹⁴ introduced their method for the demonstration of specific antibodies in the blood of syphilitic patients. Cultures of *Spirochaete pallida* being impossible, use was made of Wassermann and Bruck's discovery that extract of micro-organisms will act as antigen. It will be remembered that the liver of an infant suffering from hereditary syphilis is frequently so stuffed with spirochaetes that it is really almost a pure culture of the organism. Wassermann, Neisser, and Bruck accordingly argued that a watery extract of such a liver would also be an extract of *Spirochaete pallida*, and as such could be used as antigen for the detection of antibody in the blood of patients suffering from syphilis, on the principle of the Bordet-Gengou phenomenon. Experiments on apes by injecting them with this watery extract showed that antibody was produced, so that the blood serum of such apes would unite *in vitro* with the extract to form a combination with an affinity for complement. The blood serum of normal apes, on the other hand, showed no such affinity.

These experiments were rapidly followed by examination of the blood serum of syphilitics for the presence of syphilitic antibody, and it was found that in a large number of cases syphilitic serum, placed in contact with watery extract of syphilitic foetus's liver (antigen), behaved in the same manner as any other antigen-antibody combination in binding to itself complement. Normal serum, on the other hand, formed no combination with this antigen, and left the complement free.

Naturally, in an experiment of this nature, it is necessary to use definite quantities of the constituents of the test. The antigen-antibody combination would bind to itself a certain amount of complement, but if excess of the latter were added, it would be left free, and, on addition of the reagent, haemolysis would occur.

A simple example of such an experiment may be useful at this stage.

Constituents of the test :—

1. Antigen, watery extract of liver of syphilitic foetus.
2. Complement, fresh guinea-pig serum ; as a rule this, when

fresh, works at $\frac{1}{80}$ to $\frac{1}{100}$, or, in other words, 0.0125 to 0.01 c.c. is sufficient to haemolyse completely 1 c.c. of a 5 per cent. suspension of blood cells to which excess of haemolytic amboceptor has been added.

3. Syphilitic serum, to be tested for presence of antibody.

4. Normal serum, control.

5. Sensitized sheep corpuscles, i.e. a 5 per cent. suspension of washed sheep corpuscles in 0.9 per cent. salt solution, to which at least two doses of haemolytic serum have been added.

Five small test-tubes are taken and marked in any convenient manner, e.g. A, A', B, B', C. Into A and A' is put 0.2 c.c. syphilitic serum. Into B and B' is put 0.2 c.c. normal serum. Into A, B, and C respectively is put 0.2 c.c. extract, and into every tube is put 0.1 c.c. complement.

It is thus seen that A' and B' differ from A and B in containing no extract. They are used to show that the serum alone, in the amount used, will not bind the complement, while C tube, which contains no serum, is a control to show that the extract alone in this quantity will not bind the complement.

The quantity in each tube is made up to 1 c.c. by addition of 0.9 per cent. NaCl solution, and all five tubes are put into an incubator at 37° C. for an hour. At the end of this time they are taken out, and it then becomes necessary to find in which tube the complement remains free, and in which it has been bound. The reagent is accordingly added to each in the shape of 1 c.c. sensitized red cells, and the tubes are put back into the incubator. At the end of a short time (varying from fifteen to sixty minutes) it is found that haemolysis has occurred in every tube except A—the tube containing syphilitic serum and extract (antigen) with complement. In A tube alone, therefore, has the antigen found its corresponding antibody, and the complement consequently been bound.

The natural inference from such an experiment as the above, and from many others which showed it was only in the tubes containing syphilitic serum and syphilitic liver extract that the complement was bound, was that the serum of a large proportion of syphilitics contains antispироchaete substances

which can be detected by the Bordet-Gengou phenomenon as modified in the matter of antigen by Wassermann, Neisser, and Bruck.

So far the reaction appeared to be simply a case of antigen combining with its specific antibody to attach complement, and it had not occurred to Wassermann and his colleagues that there might possibly be a substance other than antispirochaete amboceptor present in syphilitic serum which could unite with some other substance extracted from the syphilitic liver, together with the spirochaete extract, and the combination attach complement just as antigen-antibody does.

It was then pointed out by Marie and Levaditi,¹¹⁵ however, that extracts of certain normal organs could act with syphilitic serum in a manner similar to extract of syphilitic foetus's liver; and this observation was quickly confirmed by Landsteiner, Michaelis, and many others. At the same time, however, it was shown that these watery extracts worked in a more feeble manner than those of syphilitic organs containing the spirochaetes.

Bruck¹¹⁶ then showed that if the normal organ were extracted with $\frac{1}{5000}$ to $\frac{1}{10000}$ solution of normal K.O.H. solution the deviating power of the extract became equal to that of syphilitic organs.

It has since been found that alcoholic extracts of normal organs possess this deviating power to a high degree when in contact with syphilitic serum, and it is, in fact, the practice in many laboratories now to use these alcoholic extracts instead of watery extracts of syphilitic and other organs.

In addition to these, it was further discovered that a number of lipid substances, e. g. lecithin,¹¹⁷ oleate of soda,¹¹⁸ cholesterin,¹¹⁹ and glycocholate of soda,¹²⁰ could act as 'antigen', replacing extract of syphilitic liver, in this reaction.

Evidently when extracts of normal organs and solutions of lipoids are used, the reaction is not antigen-antibody combination in the Bordet-Gengou sense, and the question arises whether the combination of watery extract of syphilitic organs with syphilitic serum can be interpreted in this sense, or in that of the unknown principle which underlies the combination of syphi-

litic serum, with lipoids or alcoholic extracts of organs which probably act by virtue of their content in lipoids.

The earlier experiments of Wassermann, Neisser, and Bruck would indicate that watery extracts of syphilitic organs contain true antigen and find a true antibody in syphilitic serum, while alcoholic extracts and lipoids find another body which exists in addition to true antibody, and that the combination of these other substances with the lipoid has a similar affinity for complement to that possessed by antigen-antibody. Much work remains to be done before this question can be settled.

It would be out of place in a paper of this nature to enter upon any lengthy discussion of the nature of these substances, and the manner in which, combined with lipoid substances, they bind complement.

Noguchi¹²¹ showed that sera which gave the reaction had a high globulin content, while Klausner,¹²² observing a precipitate to occur on the addition of distilled water to syphilitic serum, believes that the substance is a globulin.

Wassermann, noting its affinity for lecithin, suggested that the substance might be a toxin with a great avidity for lecithin, and it has been suggested that it is this affinity which may be the cause of tabes and of general paralysis, in that the toxin circulating in the blood tears from the central nervous system the lecithin which is such an important constituent of nerve tissue.

Regarding the manner in which complement is bound in this reaction, Fornet and Schereschewsky¹²³ showed that a precipitate forms on the addition of serum of a florid case to serum of an old case of syphilis. Porges and Meier¹²⁴ demonstrated a similar precipitate on contact of syphilitic serum with solution of lecithin, while Sachs and Altmann¹²⁵ showed the same phenomenon with oleate of soda. These authors further showed that certain physical and chemical agencies influence both the precipitation and complement binding phenomena of syphilitic sera in a parallel manner. Elias, Neubauer, Porges, and Salomon,¹²⁶ as the result of a carefully conducted research, concluded that precipitation and complement deviation reactions in syphilis depended on interaction of colloids, and that the bodies in syphilitic sera which

gave precipitation and complement deviation reactions with lipoids were albumens in an unstable condition.

They point out that syphilitic sera differ only from normal in that the zone of precipitation in the presence of lipoids is considerably broader in the case of the former, while complement deviation occurs also in the case of normal sera, though to a much less extent. They further confirm Sachs and Altmann's discoveries that unheated sera give heavier precipitation and deviate more strongly than sera which have been heated to 55° C. for half an hour, while acids increase and alkalis diminish both reactions.

Against this close parallelism between precipitation phenomena and complement deviation, it has been shown that while precipitation with lipoids is by no means specific for syphilitic sera the complement deviation is very closely so.

The whole question is by no means settled, and is one on which it is impossible to offer any opinion at present, but it may, I think, be safely assumed that, granting the presence of a true antibody, there is also in syphilitic serum a body which, while present also in normal serum to a slight amount, exists in the former in quantities which are easily detectable. An important fact which depends on this is that the presence of this body, as detected by the usual Wassermann test, does not indicate the high resistance to which the individual has attained, but the perverted and abnormal condition of his tissues.

The amount of this perversion and abnormality would, on this reasoning, be an index of the activity of the invading parasite, and the Wassermann reaction should, therefore, be a guide to the value or otherwise of the various lines of treatment designed to destroy that activity.

CHAPTER XVIII

THE SPECIFICITY AND OCCURRENCE OF THE WASSERMANN REACTION IN SYPHILIS

It would naturally be expected from the above consideration that, as the substance in syphilitic serum which causes deviation of complement is not an antibody specific to the *Spirochaete pallida*, it is not specific to syphilis, but likely to be found in sera of normal persons, or, at any rate, in other diseases to the same extent as in syphilis.

Fortunately, as will be shown, this is not the case to an extent which seriously affects the clinical value of the reaction. In this connexion I cannot do better than quote the statistics collected by Carl Bruck.¹²⁷

Including 2,856 cases of his own, this author gives particulars of 14,529 cases, whose blood serum was examined in this way. Of the 5,028, included in these, who were suffering from other diseases and denied having suffered from syphilis, 59 gave a positive reaction. Included in these were 3 moribund cases, 5 cases of tuberculosis, 4 tumours, 2 cases of leprosy, 1 yaws, 1 scarlet fever, 1 deaf-mute (probably hereditary syphilis), 1 multiple sclerosis, 1 paralysis, 4 pneumonia, 2 cases of typhoid fever, 1 herpes, 2 aortic disease, 1 gonorrhoea, and 1 paraphimosis, while of the remaining 24 cases, in 5 the reaction was incomplete, in 1 the serum a few days later gave a negative reaction, and 1 was proved later to have had syphilis a long time previously.

In reference to the moribund cases, out of 101 specimens of serum from cadavera, in the practice of Geheimrat, Ponfik, and Winckler,¹²⁸ 59 gave a positive reaction, and it is probable that the substances producing this phenomenon are elaborated immediately before death in very many cases. Respecting the cases of tuberculosis, and of tumours, Seligmann and Blume¹²⁹

show that in diseases accompanied by great wasting there is a tendency to give a positive reaction to this test.

Granting the occasional positive reactions in moribund cases, in late tuberculosis, in tumours with wasting, and in pneumonia, six diseases require special mention and their position clearly defining in regard to this reaction. They comprise practically the whole of the remaining diseases in which a positive reaction has on occasions been obtained. They are yaws, scarlet fever, leprosy, trypanosomiasis, relapsing fever, and malaria.

In yaws, Bruck¹³⁰ and Hoffmann and Blumenthal¹³¹ report positive reactions occurring sufficiently constantly for remark. The clinical resemblance between yaws and syphilis, and the close likeness which their respective micro-organisms bear to one another, make it very probable that the two are allied diseases, though Neisser, Baermann, and Halberstädter's¹³² experiments have shown them to be different. They recall the relationship between typhoid and paratyphoid infections. In trypanosomiasis, Landsteiner, Muller, and Poetzel¹³³ have shown that the sera of rabbits infected with *Trypanosoma equiperdum* and *Trypanosoma gambiense*, respectively, gave a positive reaction.

Scarlet fever is of more clinical interest in this respect, on account of its almost similar pandemicity to syphilis, and the possibility that, on occasion, the two diseases might be confused.

Much and Eichelberg¹³⁴ first pointed out that 40 per cent. of their cases of scarlet fever gave a positive reaction. Their observation naturally created considerable interest, and bacteriologists immediately set to work to test its truth. In 203 cases investigated in various laboratories by Schleissner,¹³⁵ Jochmann and Topfer,¹³⁶ Meier,¹³⁷ Hohne,¹³⁸ and Boas and Hauge,¹³⁹ only one positive result was obtained. Further, Zeissler,¹⁴⁰ in Much's laboratory, obtained only three positive reactions in 42 cases.

Seligmann and Klopstock¹⁴¹ investigated 13 cases of scarlet fever, and at first obtained negative results, but suddenly the sera of their cases of this disease began to give positive reactions with the same extract. Further investigations showed that this extract had commenced to give positive reactions with several normal sera, and had therefore become useless for the

test. These workers suggested that Much and Eichelberg's reactions might have been obtained with a similar extract. Considerable light was thrown on the question by Halberstädter, Muller, and Reiche,¹⁴² who showed that while one extract might give a positive reaction with a high percentage of scarlet fever cases, another would give persistently negative results, both extracts being of apparently equal deviating power when used with syphilitic sera, and never showing a positive reaction with any normal serum. Bruck and Cohn¹⁴³ were able to confirm this observation. They used eight different alcoholic extracts, all well accredited by numerous tests on syphilitic and normal sera, and found that while four of the extracts failed to react with scarlet fever serum, one gave five positive reactions out of eleven tests, a second, two positives out of twenty-two, and a third, one positive in fourteen.

These discoveries appear to afford an ample explanation of the results published by Much and Eichelberg.

Further investigations on the reaction in scarlet fever by Foa and Koch¹⁴⁴ gave negative reactions in 59 cases, while Hecht, Lateiner, and Wilenko¹⁴⁵ in 119 cases obtained three positive reactions, including two with sera of cadavera, and one in a case of severe uraemia. All workers are agreed that in any case the reaction rapidly disappears in the case of scarlet fever, and it is therefore clear that, with the knowledge of the facts above related, the case of scarlet fever need present no difficulty to the pathologist in his interpretation of results by the Wassermann reaction.

In cases of leprosy, Eitner,¹⁴⁶ Wechselmann and Meier,¹⁴⁷ Slatineano and Danielopol,¹⁴⁸ and others, have shown that in a very high percentage of cases, the sera not only give the complement deviation with leprosy extracts, but with extracts identical with those used for the reaction in syphilis. Most of the workers agree that it is chiefly in the tubercular form that the reaction is given. An important point (pointed out by G. Meier), by which leper serum can be distinguished from syphilitic serum, is that the former gives complement deviation with tuberculin as well as with the extract used in the syphilitic reaction, while syphilitic serum does not react with tuberculin.

In malaria, Boehm¹⁴⁹ announced that he obtained 35·5 per cent. of positive reactions. This occurred only in early cases, and disappeared under treatment with quinine.

In relapsing fever, Korschun and Leibfreid¹⁵⁰ obtained twenty-seven positive reactions in fifty cases. The serum of relapsing fever cases, however, gives a positive reaction with extract of relapsing fever liver, in strengths of the latter which are considerably less than those of syphilitic extracts which are necessary to produce the reaction.

THE OCCURRENCE OF THE WASSERMANN REACTION IN SYPHILIS

It is usual, in speaking of the occurrence of this reaction in syphilis, to mention some percentage (generally about 80) of cases in all stages of the disease in which a positive reaction has been obtained. Such a figure can convey little information on account of the wide variations which occur in different stages of the disease, and it will be of more practical value to consider the question from the points of view of its incidence : (1) in the different stages ; (2) under the influence of treatment ; and (3) in hereditary syphilis.

Regarding its occurrence in different stages of the disease, the following table shows the percentage of positive reactions obtained by various workers. The last two columns show the percentages of positive reactions obtained by Noguchi on a large number of sera which he tested both with the original Wassermann technique and his own modification, which follows the principles of the original method, but uses anti-human serum and human red cells for the haemolytic system instead of sheep's red cells and anti-sheep's red-cell serum. This modification will be referred to in more detail later.

TABLE IX

	<i>Bruck-Stern,¹⁵¹ Merz, and Grosser (Average).</i>	<i>Ledermann.¹⁵²</i>	<i>Jesionek¹⁵³ and Meirowsky.</i>	<i>Noguchi.¹⁴</i>	
				<i>Org.</i>	<i>Mod.</i>
Primary . . .	72·0	63·0	66·6	73·9	86·9
Secondary . . .	94·1	98·0	96·7	87·3	96·2
Tertiary . . .	73·9	96·2	87·5	80·0	87·6
Early latent . .	31·3	75·6	50·3	48·0	66·6
Late latent . .	29·8	65·7	46·4	75·0	84·3

Out of 489 sera of syphilitic soldiers which the author has examined, the positive reactions were as follows : Primary, 71·8 per cent.; secondary, 90 per cent.; tertiary, 83·5 per cent.; early latent, 56·5 per cent.

In the absence of details as to treatment, it is rather difficult to compare the results of the different workers. As will be shown later, treatment has a marked effect on the reaction, even though this may be only temporary in a certain number of cases. In my own cases, the results under the heading of secondary stage would doubtless have shown a considerably higher percentage of positive reactions if thirteen out of the fifteen sera which gave a negative reaction had been excluded on the ground of the patient's having received at least one course of injection or inunctions.

A great difference is noticeable in the results of different workers when the serum is tested in the primary stage, and this is doubtless due to the different ages of the sore at which the sample was taken for examination. Levaditi, Laroche, and Yamanouchi¹⁵⁵ found that when the sore was 8–15 days old they obtained 33 per cent. of positive reactions, while sera taken when the sore was 15–30 days old gave 57 per cent. of positive reactions. Fischer's and Blumenthal and Roscher's¹⁵⁶ results coincide very closely with this. These workers found that the percentage of positive results rose from 27 in the fifth and sixth week after infection, to 75 in the sixth to seventh week. A few cases of a positive reaction occurring even before the appearance of the sore have been recorded. On the whole, therefore, it may be said that, in the majority of cases, a positive reaction cannot be expected before the sixth week after infection, or the fifteenth day after the appearance of the primary sore. As Joltrain¹⁵⁷ remarks, the first appearance of the reaction is coincident with the so-called immunity of the skin, by which is meant the resistance of the skin to reinfection with production of a primary sore. Neisser has further shown that this skin 'immunity' does not occur till the infection has become generalized, so that on these grounds a positive reaction would argue generalized infection. It might be urged that as a positive

reaction does not make its appearance till some days after the primary sore, generalized infection does not occur till later as well, and that therefore excision of the sore sufficiently early would frequently result in cutting short the disease. Unfortunately the failures in this direction by far outbalance the successes, and it is probable that the Wassermann reaction is not sufficiently delicate to indicate the first appearance of generalized infection.

The reaction is always more marked when the patient is suffering from active signs of the disease, as is evident from the above table.

In *Parasyphilis*, the reaction has proved of special value when applied to the cerebro-spinal fluid. In general paralysis, Wassermann and Plaut¹⁵⁸ obtained 88 per cent. of positive reactions with this fluid. Henderson Smith and Candler¹⁵⁹ found that 88.9 per cent. gave a positive reaction with the fluid removed during life. Marie and Levaditi¹⁶⁰ divided their cases into early, possibly doubtful; (2) more advanced; and (3) well marked. In very early cases 10 per cent. were positive; in more advanced, 75 per cent.; and in well advanced cases, 95 per cent. They concluded from these results that the earlier the disease the less likely is the cerebro-spinal fluid to give a positive reaction. They never obtained a positive reaction with the cerebro-spinal fluid of cases of syphilis which were not suffering from any disease of the central nervous system.

In tabes, the cerebro-spinal fluid appears to give the reaction much less frequently (about 50 per cent.).

The blood serum appears, from the statistics of numerous workers, to give a positive reaction in 80 to 90 per cent. of cases of general paralysis, and in 50 to 75 per cent. of those of tabes.

The value of the Wassermann test in diagnosis will be apparent from the facts already related. While it is absent in practically every other disease, it enables a diagnosis of syphilis to be made in a rapidly increasing proportion of cases from the fifteenth day after the appearance of the sore, and therefore from three weeks to a month before any assistance could be derived from any clinical method of diagnosis. Its value in this respect may not

be so great during the secondary stage, as clinical manifestations are generally sufficiently clear, but in stages later than secondary, where the malady frequently manifests itself in a manner which does not display the true character of the underlying disease, the test must be of the greatest assistance in affording evidence that the patient is at any rate suffering from syphilis in a more or less active form. It would naturally be very unwise to argue that a positive reaction to this test must necessarily indicate that the symptoms which the patient shows are due to syphilis. The result of the blood examination must simply be added to the facts which the physician or surgeon has gathered by other means of diagnosis, and he must naturally be the judge as to the weight to be attached to evidence thus afforded.

The value of a negative reaction is naturally not nearly so great as that of a positive. In no stage of the disease is a positive reaction invariable, so that it would be wrong to argue from absence of the reaction, that there is absence of syphilis. At the same time, particularly in untreated cases, the proportion of negative results in syphilis is very low, and I believe that, if care be taken not to heat the tested serum for an unnecessarily long time, it can be made still lower, so that a negative reaction under such conditions may still afford evidence of some value.

THE EFFECT OF TREATMENT ON THE REACTION

It has been shown that there is very strong evidence that the substances which give rise to the reaction of syphilis are not anti-spirochaete bodies, but disease products of another kind, and the high percentage of positive reactions which occurs in active stages of syphilis indicates that these products are the result of the activity of the parasite. Naturally, therefore, it might be expected that the effect of a treatment designed to destroy the activity of the invading parasite, and eventually to exterminate it, would be reflected in the result of a test of the blood serum by this method. A great amount of attention has been devoted to this side of the question, and the majority believe that treatment has a very marked effect in converting a previously positive into a negative reaction. Thus Heller,¹⁶¹ in 77 cases observed at different

stages of their treatment, found that of 57 which originally gave a positive reaction, 22 became negative, while in 17 the reaction became markedly weaker. Bering¹⁶² found that of 8 cases of untreated syphilis in the later stages, 7 gave a positive reaction; of 70 cases which had been only treated as symptoms arose, 52 gave a positive reaction, while of 69 which had received steady treatment throughout, only 11 reacted positively. Citron¹⁶³ holds that in 75 per cent. of cases it is possible to lessen, and in 50 per cent. to abolish the reaction entirely by steady intermittent treatment. This worker holds that (1) the longer the virus has acted on the tissues, the stronger the reaction is likely to be; (2) the earlier and the more persistently the treatment is carried out, the less is the reaction likely to occur. In illustration of the effect of treatment the following table shows percentages of positive results obtained by workers in Bruck's laboratory,¹⁶⁴ by Ledermann,¹⁶⁵ and by the author with the sera of patients who had received varying numbers of courses of treatment with mercury.

TABLE X

	Bruck.*	Ledermann. (Latent cases only).	Harrison.
Untreated	—	88.8	93.5
After one course	62.1	87.5	83.6
„ two courses	48.3	—	77.5
„ three „	40.5	68.7	64.5
„ four „	38.0	36.3†	56.5
„ five „	36.1	—	50.0
„ six „	20.0	—	34.6
„ seven „	24.5	—	55.0
„ eight „ or more	14.2	—	21.5

Though treatment has such a marked effect in converting a positive into a negative reaction, it must not be inferred that when the reaction has become negative it invariably remains so.

* Averages of percentages of positive reactions which occurred in all stages. The figures are further analysed in Bruck's *Die Seradiagnose der Syphilis*, and the percentages obtained in each stage of the disease, after the varying numbers of courses of treatment, are shown.

† This number represents percentage of positive reactions in latent cases which had received four or more courses.

On the contrary, the experience of most observers is that it returns to positive if treatment be suspended too early. My own experience is that a negative reaction is frequently obtained at the end of a course of treatment, but that at the end of the interval of rest it returns again to positive in the great majority of cases in the early stages. Later, however, when the case has received six or more courses of injections, it frequently happens that the negative reaction which occurred at the end of the last course is still existent after the rest. Experience will decide whether such cases, i. e. those in which a negative reaction was obtained, and in which it was possible to maintain its negative nature by treatment, eventually suffer from no further effects of the disease. The time which has elapsed since the adoption of the test as a clinical measure is as yet too short to decide this question. Cases in which the positive reaction persists are generally those in which symptoms also persist in spite of treatment. Regarding the value of the reaction from the point of view of directing the amount and kind of treatment, it is as yet too early to lay down any definite rules, but it seems certainly to be indicated that a positive reaction after any length of treatment is an indication to pursue the treatment for a longer period, though it would naturally be unwise to push specific remedies regardless of the condition of the patient, in the endeavour to convert his positive into a negative reaction. Regarding suspension of treatment in the presence of a negative reaction, all workers agree that a negative reaction should be viewed with considerable circumspection from this point of view. A negative reaction obtained on one examination is no criterion that the parasite has been exterminated. Probably the safest course to adopt would be to give at least two years of treatment in any case, and then to bring into review the history from the point of view of the blood test. If a negative reaction has been maintained for some months by treatment, a longer interval of rest should be allowed and the blood tested every three months during that interval. If the negative reaction still persists (when the blood is tested by some modification, such as Hecht's or Stern's, which makes use of unheated serum), there appears to be ground for hope that the disease has been eradicated. Even then, how-

ever, it would be the safest course to test the blood at intervals for some years.

In Congenital Syphilis the Wassermann reaction has thrown light on a number of important questions, and though it is impossible to go into these at great length, the observations of many workers are so suggestive and appear to have such a practical bearing on the problem of reducing the handicap to which a large number of children are subjected by reason of the sins of their parents that they must be mentioned, however shortly.

In 74 cases of hereditary syphilis of varying ages, a positive reaction was obtained in 69 by eleven observers. The experience of most workers has demonstrated the persistence with which a positive reaction remains in the case of congenital syphilis in spite of treatment. It appears to the writer not surprising that this should be so when one remembers the effect of early treatment or the reverse in the case of acquired syphilis, and the fact that in a large proportion of syphilitic infants the infection has had a start of at least nine months before treatment is commenced.

The examination of the blood serum of mothers who have borne syphilitic infants has revealed a number of important points. As is well known, many mothers of syphilitic infants are themselves apparently healthy, and from the fact that they are not infected by the closest contact with their diseased children arose Colles's law. Out of 159 mothers of syphilitic infants whose blood was examined by various workers, 128 give a positive reaction; of 117 of these positively reacting cases, in which the fact was elicited, 58 had shown no signs of syphilis as far as could be ascertained. It is evident, therefore, that if one believes that complement deviating substances are not immune bodies in the case of syphilis, and if we also exclude the possibility of transmission of the deviating substances from the child to the mother through the placenta (a possibility which does not seem to have been proved by the evidence), a considerably higher proportion of the mothers of syphilitic infants are themselves suffering from syphilis than was at first thought. Thomsen and Boas¹⁶⁶ conclude with regard to this question that (1) a positive reaction in the mother is an indication that the child will probably be syphilitic,

and (2) mothers who bear syphilitic children are themselves to be considered as syphilitic when their blood gives a positive reaction.

The possibility of saving a large infant mortality, suffering, and disease, is apparent from this work. In a very large number of cases it is the father who originates the infection in the family ; in many cases he is aware of the possibility that his children may be syphilitic when born, or show signs of syphilis in later life, and it appears feasible that the duty of having not only his own blood but that of his wife examined by the Wassermann test should be impressed on such a man. A positive reaction in the case of the mother should be a certain indication for careful treatment. In no other way does it seem possible to prevent the parasite from gaining that foothold in the tissues of the infant which, when once established, is so difficult to eradicate.

CHAPTER XIX

TECHNIQUE OF THE WASSERMANN REACTION

THE most usual methods of obtaining the reagents for the test are as follows :—

‘Antigen’, or extract, is prepared in many different ways. The original method was to grind up one part of the liver of an hereditarily syphilitic infant with four parts of salt solution (0.9 per cent.), containing 0.5 per cent. carbolic acid. The mixture was kept for twenty-four hours in a bottle, being frequently shaken in the meantime, and then gently centrifugalized or, preferably, decanted.

Levaditi ¹⁶⁷ grinds up the liver of a syphilitic or normal newborn infant with the least possible quantity of salt solution, dries the mixture *in vacuo* over sulphuric acid, and prepares the extract for use by adding one part of the dry powder, which results from the desiccation, to thirty parts of salt solution, leaves the two in contact for twenty hours on ice, and then centrifugalizes to obtain the clear liquid which is used for the test. Bruck ¹⁶⁸ recommends that this clear liquid, prepared according to Levaditi’s method, be dried *in vacuo*, and the resulting powder sealed in fused tubes in quantities of 0.1 gm. He states that the powder, thus kept, retains its properties indefinitely in the tropics. When required for the test 0.1 gm. of the powder is dissolved in 1 c.c. distilled water.

Watery extracts are very uncertain and apt to diminish in power somewhat rapidly, so that it is probably more usual to use alcoholic extract of solid syphilitic or normal organs, which retain their power for long periods. The organs which are commonly used are liver of syphilitic infant, normal infant’s liver, guinea-pig’s heart, guinea-pig’s liver, rabbit’s heart, human heart, and ox heart. Many others might be mentioned, but these are

most commonly available. The following are the more common methods of preparing alcoholic extract from these organs :—

1. The organ is cut up very finely and mixed with absolute alcohol in the proportion of one of organ to nine of alcohol. The mixture is shaken in a shaking machine together with glass beads for twenty-four hours, and is then filtered through ordinary filter-paper.¹⁶⁹

2. The organ is minced very finely and then ground up in a mortar with broken glass while alcohol is added, little by little, till the proportion is one of organ to five of alcohol. The bottle containing the mixture is then transferred to a water bath at 60° C. for two hours and kept at the room temperature for twenty-four hours, after which it is decanted.¹⁷⁰

3. The author has found the following plan to yield excellent extracts :—The organ is finely minced and ground up with 96 per cent. alcohol, together with broken glass, the proportions being one of organ to four of alcohol. The mixture is then transferred to a bottle and placed in the incubator for three days at 37° C., kept at the room temperature for three more days, and then filtered through ordinary filter-paper. After filtration it is kept in the ice chest for a week before being used ; during this time, a fine deposit gradually settles which should be left undisturbed.

However prepared, the filtrate must be quite clear.

Artificial Extracts. As has already been mentioned, several workers have found that syphilitic serum would produce deviation of complement when in contact with various chemical substances which can be manufactured by the chemist. Amongst these may be mentioned lecithin (Porges and Meier¹⁷¹), sodium oleate (Sachs and Altmann¹⁷²), and sodium glycocholate (Levaditi and Yamamouchi¹⁷³), as well as the combination of some of these which has been recommended by Sachs and Rondoni.¹⁷⁴ The last-named workers, recognizing the difficulty which frequently occurs of obtaining the necessary organ for preparation of the extract, as well as the variations in deviating power which extracts prepared under apparently identical conditions show, sought to construct a combination of chemical substances which could be prepared with the convenience and accuracy with which chemical reagents

are usually compounded. As a result of their experiments, they recommended the following alternative combinations :—

	A	B
Sodium oleate (Kahlbaum, Berlin)	2.5 or	1.0
Ovo-lecithin (Merck's)	2.5 or	1.0
Oleic acid (Merck-Kahlbaum brand)	0.75 or	1.5
Distilled water	12.5 or	5.0
Alcohol to	10,000 or	10,000

For details of the preparation of these two mixtures, which are somewhat intricate, the original paper should be consulted. I have no experience of either of these combinations, and the opinion of workers seems to be, on the whole, against them. Bruck points out that the lecithin manufactured by a single firm may differ considerably in quality from time to time, and, as the above combinations were only arrived at by Sachs and Rondoni after what appears to have been a most laborious research, the use of artificial extract does not appear likely to simplify the test if the correct proportions have to be worked out every time a new supply of lecithin is obtained.

Complement. Guinea-pig's blood serum is used for the most part by those who adhere to the principles of the original Wassermann test. It may be obtained by anaesthetizing the animal by ether and, having removed the skin and subcutaneous tissue from the front of the chest, pushing the point of a large-chambered pipette into the right heart. The blood is sucked up into the chamber of the pipette till no more can be obtained in this way ; the chest is then opened, and as much blood as possible taken from the cavity after removing the heart and lungs.

This method entails the sacrifice of a guinea-pig every time that a batch of tests has to be carried out, and I think that, on the whole, it is unnecessary, particularly if small quantities of the reagents are used in the test, in the manner to be mentioned later. It is possible to obtain 3 to 4 c.c. of blood from the ear of a guinea-pig without the animal showing the least sign of distress, and I have generally obtained it in this way. The ear is well rubbed with wool soaked in alcohol and then dried, when it will be seen that a number of small vessels converge towards the margin. The ear is folded together and, with a sharp pair of

scissors, a shallow, V-shaped portion snipped off, so as to include a few of the vessels. The blood is collected in capsules.

Guinea-pig complement should be quite fresh to give consistent results, and should certainly not be used when more than twenty-four hours old. I prefer to use it when four to five hours old. To obviate the inconvenience which arises from the rapid deterioration of complement with age, Noguchi¹⁷⁵ recommends that the fresh guinea-pig's serum be dried rapidly on blotting-paper. I have no experience of this, but Bayly¹⁷⁶ has found it a useful means of preserving its power.

The serum to be examined is obtained either from the finger or lobe of the ear, when it is collected in capsules, or by puncture of a vein. The latter method, which is really less painful and considerably more rapid, is preferable. The arm is dried at the bend of the elbow, and, with a camel-hair brush, a mixture of one part of iodine in fifteen parts of chloroform painted on a prominent vein to sterilize the skin at the site of the proposed puncture. The upper arm is constricted with a rubber band, and a sharp sterile hollow needle run into the vein, keeping the eye of the needle up and the needle itself almost parallel with the skin surface. The blood is received into a test-tube, and when sufficient has been drawn off, the needle is removed, an antiseptic swab being immediately applied to prevent the formation of a haematoma. The test-tube containing the blood is put into the incubator for a few hours to allow the clot to contract and the clear serum to separate. Human serum, like all other, when fresh contains a certain amount of complement, and to avoid the inaccuracy which would result from the presence of an unknown quantity of complement in the test, in addition to that which is added in the shape of guinea-pig's serum, the original technique provides for the removal of this complement by heat. Sachs and Altmann,¹⁷⁷ however, showed that by heating every serum loses its deviating power very considerably, and Noguchi¹⁷⁸ has estimated this loss at from 50 to 75 per cent. If a *normal unheated* serum be put up in the same amount and with the same quantities of extract and complement, it will frequently be found that deviation of complement will occur in spite of the fact that the tubes contain not

only the standard amount of guinea-pig complement but human complement as well. On account of the loss in deviating power which occurs from heating the serum, it has been suggested to use unheated serum while otherwise following the original technique. To carry this out it would be necessary in every case to wait for a few days for the natural complement to die out so as to avoid the disturbing influence of unknown amounts of natural complement, and this is sometimes inconvenient. Noguchi uses unheated serum in his modification, but as he uses human cells in his haemolytic system, and the effect of human complement on human cells is very much less than that of guinea-pig complement, he is able to neglect the slightly disturbing effect which the human complement has on his test.

In order to overcome these difficulties, I made a number of experiments to determine the minimum time in which complement could be destroyed by heating at 55° C., and to ascertain whether a serum which had been heated for the minimum time had greater deviating power than the same serum possessed after heating for the half-hour usually recommended. It was found that heating for ten minutes at 55° C. completely destroys the complement in human serum. Comparison between sera which had been heated at 55° C. for ten minutes and those which had been subjected to the same temperature for half an hour showed that, as regards their respective deviating powers, the serum which had been heated for ten minutes only was stronger than the same serum after heating for half an hour. The difference was not so apparent in the case of sera from florid cases of syphilis, but in those of cases which had been well treated it was very marked. On this account it is now my practice to heat at 55° C. for ten minutes only, as I believe that in this way a considerable gain in delicacy is obtained.

In place of blood serum, cerebro-spinal fluid is frequently tested, and affords valuable information, especially in cases of tabes and general paralysis. The fluid is removed in the usual way by lumbar puncture; contamination with blood should be strictly avoided, as the presence of deviating power in the cerebro-

spinal fluid as distinct from the blood serum gives the most valuable information.

The *haemolytic system*, which is used as the reagent to test for the presence of free complement, is obtained as follows (workers, for the most part, use sheep's red cells and anti-sheep's red-cell serum):—Sheep's red cells may be obtained from the slaughter-house. The blood is received into a bottle containing a number of glass beads, and is then well shaken to remove the fibrin. If aseptic, it will keep on ice for five days. The cells are prepared for the test by centrifugalizing and re-suspending the deposit in salt solution (0.9 per cent.) at least three times, to free the blood completely of serum. After the last centrifugalization the deposited cells are made up into a 5 per cent. suspension with salt solution (0.9 per cent.).

Anti-sheep's red-cell serum is obtained by injecting a rabbit, at intervals of eight days, with sheep's blood cells which have been washed as shown above. The injections may be made into a vein, in which case 1 c.c. of the deposited cells, with 2 c.c. salt solution, is injected into the marginal vein of the ear, or intraperitoneally, when increasing doses of the cells are injected, commencing with 5 c.c. and increasing to 10 to 15 c.c. After four or five injections, the rabbit's serum will be found to be strongly haemolytic for sheep's red cells, and eight days after the last injection the animal should be anaesthetized and bled in the manner first described for obtaining guinea-pig's blood. It is necessary that the most rigidly aseptic precautions be taken in this operation, and when the serum has separated it should be drawn off into sterile capsules or ampoules, and heated at 55° C. for half an hour to destroy its complement. In an aseptic condition it will retain its power for many months.

Having obtained the constituents of the test, it is necessary to ascertain the amount of each which is a suitable quantity to use. In considering this question it is to be remembered that it is not so much the actual total amount of the reagents used as the proportion which each bears to the others which matters. Naturally, if excess of complement were added to a given amount of extract and serum, the excess would cause lysis of the sensitized

cells in any case, and this would mask any binding of complement which might have occurred in the preliminary incubation. Similarly, excess of extract would cause deviation of complement in the presence of a normal serum.

The aim in fixing the proportions is to find the combination of extract and human serum which will bind a given number of doses of complement in the case of a syphilitic serum, but will invariably leave one dose free to cause haemolysis when normal serum is used with the same amount of complement.

As the unit on which the proportions are based, the quantity of sensitized cells is taken, and in the practice of most workers this unit is fixed at 1 c.c. My own practice, and that of Weidanz,¹⁷⁹ amongst others, is to make this unit one volume, the size of the volume being fixed at any convenient amount. It will probably be better to describe the technique when the unit is taken as 1 c.c., and then to indicate how it may be modified for the case when volumes are used.

Titration of the haemolytic amboceptor. It is necessary, in the first place, to find the minimum amount of amboceptor which is sufficient to cause haemolysis of the sheep's red cells in the presence of the amount of complement to be used in the test. The quantity of the latter is usually 0.1 c.c. Into each of a series of small test-tubes is placed 1 c.c. of sheep's red cells, and to each is added 1 c.c. of a varying dilution of amboceptor, e.g. to the first tube 1 c.c. of 1 in 100 amboceptor, to the second 1 c.c. of 1 in 200, and to each of the succeeding tubes 1 c.c. of 1 in 400, 1 in 600, 1 in 1,000, 1 in 1,500, and 1 in 2,000 respectively. Into a last tube, which acts as a control, is put 1 c.c. salt solution (0.9 per cent.). The tubes are preferably allowed to stand for twenty minutes, and to each is then added 1 c.c. of a 1 in 10 dilution of fresh guinea-pig serum (equivalent to 0.1 c.c. complement). The tubes are shaken and put into the incubator for an hour. At the end of this time they are taken out, and it is noted in which tube haemolysis is quite complete. The amount of amboceptor contained in this tube is considered to be the minimum haemolytic dose for purposes of calculating the quantity to be added to the red cells to sensitize them. Some workers allow the tubes to stand

all night on ice after removal from the incubator, and then take the reading, but in this case a sub-haemolytic dose of amboceptor would effect complete lysis, so that I do not think the latter method so good as taking the reading after one hour's stay in the incubator. The number of haemolytic doses of amboceptor which are added to each unit of red cells to sensitize them varies with different workers. The original directions were to add two doses, e. g. if the tube containing 1 c.c. of 1 in 2,000 amboceptor had shown complete lysis in the initial titration, 0.001 c.c. of undiluted amboceptor serum would be added to sensitize 1 c.c. of the 5 per cent. suspension of cells for the test. For many reasons I do not think that this amount is sufficient, and as the matter is one of some importance, the reasons may be mentioned here. It will be recognized as a scientific axiom that in testing a substance for the presence of a given constituent (in this case serum for the presence of syphilitic 'immune body'), it is desirable that all the other constituents in the test should be as constant in strength as possible. It has been shown above that the test relies on the neutralization, or otherwise, of a given amount of complement by a given combination of extract and human serum, and that this neutralization or otherwise of complement is detected by the behaviour of sensitized red cells when the latter are added after allowing time for combination of complement, extract, and serum to occur. Further, it is well known that a given amount of complement has a greater haemolytic power in the presence of four than of two doses of amboceptor, or, in other words, less complement will be required to haemolyse a given amount of red cells which have been sensitized with four than with two doses of amboceptor. Consequently, if one of two tubes contained a unit of cells sensitized with two doses, and the other a similar amount sensitized with four doses of amboceptor, and each contained the same amount of complement, the tube containing four doses of amboceptor would behave as if it contained a greater amount of complement than that which contained two doses. As is well known, human blood serum contains a varying amount of anti-sheep's red-cell amboceptor; if this amount were constant, it would not matter, but unfortunately the variation is sufficient

to be important, and in testing a number of different human sera the sheep's red cells, eventually added, will be sensitized with varying amounts of amboceptor. If the initial standardization has been performed without taking this fact into consideration, a serum rich in natural amboceptor, but weak in deviating power, might not demonstrate the latter, because the proportions of the constituents of the test might have been originally based on tests in which human sera containing average amounts, or less, of natural anti-sheep's red-cell amboceptor were used, and a test based on these proportions might leave an amount of complement unabsorbed which, while insufficient to effect lysis of cells sensitized with average amounts, or less, of amboceptor, would be enough to haemolyse in the presence of excess of the latter. If, however, a considerable excess of amboceptor be added, and the other reagents of the test be standardized on this basis, the proportion which the natural bears to the added amboceptor will be so small that any variations in the amount of natural amboceptor in the various sera tested can be neglected. In Bruck's laboratory it is the practice to add three to four doses, and, personally, I add five to six doses. Noguchi¹⁸⁰ uses anti-human serum and human red cells in his haemolytic system, to obviate the error arising from the presence of anti-sheep's red-cell amboceptor in human serum.

Bruck¹⁸¹ recommends that the amboceptor be titrated each time that the test is performed, on account of the variation which he finds in the power of his guinea-pig complement. This recommendation chiefly applies when complement which has been kept on ice for some time is being used. The amboceptor is titrated with the complement actually to be used in testing the sera under consideration, and the red cells sensitized with 3-4 times the minimum haemolytic dose which has been ascertained by this titration. I do not think that this is necessary when complement which is quite fresh is used, and a titration once in every few weeks seems to be sufficient.

Complement should be titrated each time. The amount of amboceptor to be used in the test is added to the sheep's red cells, and then into each of a series of test-tubes is placed 1 c.c. of a 5 per cent. suspension of sensitized cells. To each tube is

added 1 c.c. complement, in varying dilutions, as in titrating the amboceptor, and the same procedure is adopted. As a rule, I find that 0·0125 to 0·01 c.c. complement is the minimum haemolytic dose with the amount of amboceptor I use.

Extract is titrated as follows :—Into each of a series of small test-tubes is placed 0·2 c.c. of normal serum, into each of another similar set 0·2 c.c. of another normal serum, into each of a third set the same amount of serum from a case of syphilis (untreated if possible), and into a fourth the same amount of another syphilitic serum (from a treated case, if possible). The sets of tubes are conveniently set up in four rows, those devoted to each serum occupying one row. To each tube is added 1 c.c. of a 1 in 10 dilution of fresh guinea-pig serum (equivalent to 0·1 c.c. of complement), and to a corresponding tube in each row 1 c.c. of a varying dilution of extract ; e. g.

No. 1 tube in each row receives 1 c.c. of a 1 in 3 dilution of extract.

„ 2	„	„	„	„	1 in 4	„	„
„ 3	„	„	„	„	1 in 5	„	„
„ 4	„	„	„	„	1 in 8	„	„
„ 5	„	„	„	„	1 in 10	„	„
„ 6	„	„	„	„	1 in 15	„	„
„ 7	„	„	„	„	1 in 20	„	„
„ 8	„	„	„	„	1 in 30	„	„
„ 9	„	„	„	„	1 in 40	„	„

The extract must be diluted in a uniform manner in the case of each strength. Sachs and Rondoni¹⁸² first showed that if an alcoholic extract be diluted by adding it all at once to the salt solution, the result is a fairly clear solution, which has considerably less deviating power than when the salt solution is added to the extract slowly, drop by drop, and with continual shaking. As a cloudy emulsion of extract is the best, the dilution should be made in the manner indicated by Sachs and Rondoni, or in the following manner, recommended by Browning and McKenzie,¹⁸³ which results in a very turbid emulsion, and is the method which I have found to be the easiest to carry out uniformly each time. The amount of salt solution necessary for the required dilution is run into a test-tube, and on it is run the required amount of the alcoholic extract in the same manner that urine is run on to nitric acid when testing it for albumen. A ring forms at the junction of the two fluids, and this gradually thickens. It is

convenient to do this before anything else, and then to place the test-tube to one side, while the other reagents are being measured into their various tubes. The tube is then taken and rolled between the hands in the same manner that deposit is shaken up from the bottom of a broth culture; the cloudy ring slowly diffuses through the mixture, and, when the emulsion appears fairly even, the tube is inverted once or twice to complete the mixing. In order to secure uniformity, sufficient of each dilution for the whole number of tests in which it is required should be prepared at one operation. Having added the extract in the dilutions mentioned, each of the tubes is shaken, and all are then placed in the incubator at 37° C. for an hour, at the end of which time they are removed, and to each is added 1 c.c. of a 5 per cent. suspension of blood cells, which have been sensitized in the manner selected. They are then replaced in the incubator for another hour, and the results read. The results of this reading vary considerably with different extracts, and the value of the extract for purposes of the test can be estimated in this manner. With a good extract, it may happen that the tube containing 1 in 40 extract (No. 9 tube in the above table) shows no haemolysis (deviation of complement) in the case of the serum of a florid case of syphilis, while the same extract in contact with normal serum shows complete lysis in the tube containing 1 in 3 extract. On the other hand, a poor extract will show no deviation of complement with a syphilitic serum when in a dilution of 1 in 8 (and lower concentrations) and yet show deviation with a normal serum when in a dilution of 1 in 4. In choosing the amount of extract to be used in the test, it is safe to take that quantity twice the amount of which will not cause deviation of the amount of complement used when in contact with a normal serum. This amount must at the same time not cause deviation of the quantity of complement used when in contact with the latter, without the presence of any human serum, and it is necessary to test the extract in the chosen dose to see that it fulfils this condition before proceeding further. The dose of extract having been temporarily fixed in this manner, it is next necessary to test it in the presence of at least ten syphilitic and ten normal sera, together with an accredited extract, to see that it behaves

consistently (no deviation with any normal and deviation with the same syphilitic sera as cause deviation with the accredited extract) before it is taken into use for routine work. Some workers estimate the dose by the amount which fails to deviate the quantity of complement used when acting on the latter alone (without human serum), but I do not think the latter gives the information to be gathered from a titration on the lines first mentioned.

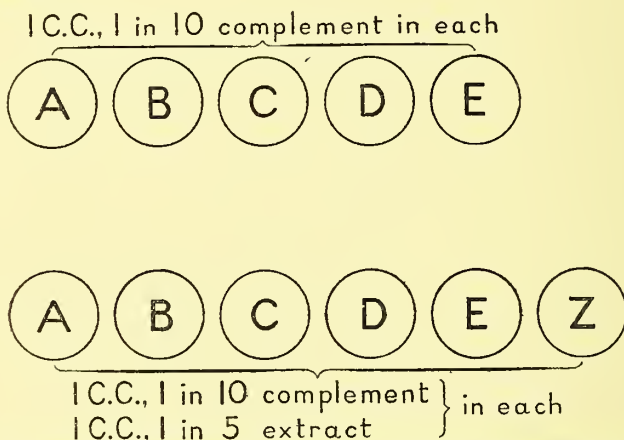


FIG. 14. Diagram illustrating arrangement of test-tubes for testing of three sera. Each A tube receives 0.2 c.c. normal serum. Each B tube receives 0.2 c.c. known syphilitic serum. C, D, and E tubes each receive sera to be examined, in the same quantity. Z tube contains only extract and complement.

Having ascertained the amounts of the various reagents to use, the test is put up as follows :—Assuming that it has been decided to use of patient's or normal serum 0.2 c.c., of complement 0.1 c.c., and that the selected dose of extract is 0.2 c.c. (i. e. 1 c.c. of a 1 in 5 dilution), sufficient of the extract for the whole series of tests is first diluted to 1 in 5 in the manner mentioned when describing titration of the extract.

A number of small test-tubes (5×1 cm.) are set out in two rows, so that they are in sets of two, those of each set being one behind the other (Fig. 4). Into each of the first set of two tubes is placed 0.2 c.c. of normal serum; into each of the next set is placed 0.2 c.c. of serum from a case of syphilis which is known to give the reaction, into each of the third set serum to be tested for the reaction, in the same quantity. Succeeding sets receive other sera to be tested, in the same manner. At the very end is

placed a solitary tube into which no human serum is put. Into every tube in the front row is placed 1 c.c. of a 1 in 5 dilution of the extract (equivalent to 0.2 c.c. extract), and this amount of extract is placed in the solitary tube at the end. Into every tube in the series, including the solitary tube, is placed 1 c.c. of a 1 in 10 dilution of fresh guinea-pig's serum (equivalent to 0.1 c.c. complement); 1 c.c. salt solution (0.9 per cent.) is placed in each tube in the back row and into the solitary tube, so as to make the amounts in each of the tubes equal.

It will thus be seen that the front row differs from the back in containing extract. The back row is a series of controls to show that each serum has not the power, in the absence of extract, of causing absorption of complement. The solitary tube at the end differs from each of the others in containing no human serum. It is a control to show that the extract, in the strength used, has not the power, in itself, of causing absorption of the amount of complement used in the test. Each tube in the back row, and the solitary tube, should therefore show haemolysis at the end of the experiment.

The tubes are then shaken and placed in the incubator at 37° C. for one hour. They are then removed, and to each is added 1 c.c. of a 5 per cent. suspension of sensitized cells, after which they are replaced in the incubator. During their stay in the incubator, after the addition of the sensitized cells, they are shaken about every ten minutes, so as to break up any clumps of red cells which may have formed from the agglutinating effect of the amboceptor serum. When the normal serum tubes show complete haemolysis, which generally occurs in from twenty to thirty minutes, the rack of tubes is removed from the incubator and left to stand at the room temperature for an hour. A reading is taken at the end of the period of incubation and again at the end of the hour's standing at the room temperature. The results are read in the following manner:—Failure to haemolyse in the normal serum tubes or in the solitary tube (extract and complement only) entails rejection of the whole experiment. Failure to haemolyse in any tube of the back row (serum and complement only) entails no record for the particular serum, of which it is a control, till it has been re-tested. No haemolysis in

any front-row tube, after satisfaction of the above conditions, is read as a positive reaction. Sometimes a front-row tube shows a little haemolysis at the end of the period of incubation, with distinct though incomplete haemolysis at the end of the hour at the room temperature. In such a case it is safer, especially if the test is for diagnostic purposes, to return a negative result, and take an early opportunity of testing the serum again.

If the tubes are left all night in the refrigerator and the results read the following morning, fallacies are apt to appear when alcoholic extract is used, on account of the haemolysis which slowly occurs from the action of unfixed or dissociated extract in the mixture on the blood cells.

Modifications of the original technique. A large number of modifications have been introduced, mainly with the object of simplifying the test. Some of these adhere to the original principle of keeping the reagents of the test, as far as possible, uniform throughout the series, while others, in the search for simplicity, depart from this principle in relying on the varying quantities of anti-sheep's red-cell substances which occur naturally in human serum, to replace the artificial amboceptor or guinea-pig complement, or both, which are used in the original method.

In order to reduce the quantities of the reagents, some, instead of making the unit 1 c.c., measure the quantity in drops. I do not consider this a very accurate method, as the size of a drop varies considerably with the pipette by which it is delivered.

I have always used the following method, which is both accurate and convenient. Instead of 1 c.c., one volume is taken as the unit on which to base the several proportions, and, for convenience, the volume has been fixed at 100 c.mm. The correct amounts of each of the other constituents are arrived at by making appropriate dilutions. Thus in carrying out the test when using the proportions above mentioned, the quantities added to each front-row tube on this principle would be :—

One volume of a 1 in 5 dilution of patient's serum,

One volume of a 1 in 5 dilution of extract,

One volume of a 1 in 10 dilution of complement,

One volume of a 5 per cent. suspension of sensitized cells.

In addition to the standard amount of complement, I have

found it useful to put up each serum with double this quantity, so, instead of two, have three rows of tubes, each tube in the additional row containing human serum and extract as in the other two, but twice the amount of complement (one volume of a 1 in 5 dilution). This modification, suggested by McKenzie,¹⁸⁴ affords much more information than can be derived from the test performed with only one quantity of complement, as it often occurs that a serum which originally was able to deviate the double quantity of complement, loses this power under the influence of treatment of the patient from whom it was derived, so that after a time it is found that it can only deviate the standard amount. In this way I believe it is possible to gauge the effect of treatment to a certain extent.

B. Klein¹⁸⁵ has lately recommended that instead of making this quantitative estimate of the deviating power by means of different quantities of complement, a standard quantity of complement should be used, but varying amounts (or dilutions) of patient's serum. I have not tried this to any great extent, but, as far as I have seen, it seems likely to afford more information than the method of using different amounts of complement.

A modification which adheres to the original principles has been introduced by Noguchi.¹⁸⁶ This worker recommends that, instead of sheep's red cells, human cells be used. Amongst the advantages which he claims for his modification are that the error due to the presence of varying amounts of anti-sheep's red-cell amboceptor is eliminated, that unheated serum can be used, as human complement has only a slight effect on sensitized human cells, and that by having the amboceptor, complement, and 'antigen' dried on filter-paper, the reaction can be performed by the practitioner in his consulting-room, a laboratory not being necessary.

The test-tubes are set out in the same way as for the original Wassermann reaction, in two rows, the front-row tubes being for human sera, extract, and complement, and the back-row tubes (the controls) for human sera and complement. Instead of the quantities mentioned in describing the original method, the amounts used are :—Human serum, one drop; complement, 0.04 c.c. (or a slip of blotting-paper, 5 mm. × 5 mm., which has taken up this amount of complement); human blood cells (in

suspension of one drop to 4 c.c. saline), 1 c.c. ; anti-human amboceptor, 2 doses (or this amount dried on blotting-paper) ; and antigen, one drop (or its equivalent dried on blotting-paper). In the preliminary incubation, the human sera, extract, complement, and human cells are mixed, and only amboceptor remains to be added for the final incubation.

Bauer's¹⁸⁷ modification makes use of the natural anti-sheep's red-cell amboceptor present in human serum.

Hecht's¹⁸⁸ makes use of the complement as well as the natural amboceptor.

For 'antigen' an alcoholic extract of guinea-pig's heart is used, and the dose of this is fixed at half the amount which just fails to bind the complement in 0.1 c.c. of fresh normal serum. The sheep cells are in a 2 per cent. suspension instead of 5 per cent. as in the original. Four tubes are devoted to the testing of each serum, and the series of sera must contain one normal and one syphilitic serum.

No. 1 tube receives 0.1 c.c. serum, 1 c.c. of a 2 per cent. suspension of sheep cells, and 1 c.c. salt solution. No. 2 tube contains 0.1 c.c. serum and one dose of extract in 1 c.c. salt solution ; No. 3 tube, 0.1 c.c. serum and two doses of the extract in 1 c.c. salt solution ; No. 4 tube, 0.2 c.c. serum and one dose of extract in 1 c.c. salt solution.

After incubation for an hour at 37° C., to Nos. 2, 3, and 4 tubes respectively is added 1 c.c. of a 2 per cent. suspension of sheep cells, and the tubes are replaced in the incubator.

The requirements for a diagnosis of syphilis are (1) complete haemolysis in the No. 1 tube ; (2) complete haemolysis in the normal serum tube with the double dose of antigen (No. 3) ; and (3) no haemolysis in the tube containing 0.2 c.c. of the serum under question, with one dose of extract (No. 4 tube).

Hecht recommends that the serum be tested when as fresh as possible.

*Fleming*¹⁸⁹ has modified Hecht's method, so as to make use of smaller amounts of the reagents. His 'antigen' is an alcoholic extract of normal heart, and the dose is fixed as the amount which fails to deviate the complement in the quantity of normal serum used in the test, while deviating that present in syphilitic

serum. Two tubes are devoted to the testing of each serum. No. 1 tube contains one volume of the fresh serum and four volumes of salt solution containing the dose of extract which has been found suitable. No. 2 tube contains one volume of the same serum and four volumes of salt solution. The tubes are incubated for an hour at 37° C., and to each is then added one volume of a 10 per cent. suspension of sheep's red cells. For a diagnosis, both the normal serum tubes and the tube containing the serum in question but no extract must show complete haemolysis after the second incubation, while the No. 1 tube devoted to this serum (extract and serum) shows no haemolysis. If the serum prove to be short of complement, it is recommended to add one volume of a fresh normal serum to it when retesting, while if it be short of natural anti-sheep amboceptor, one volume of normal serum, which has been heated at 55° C. for half an hour to deprive it of complement, has to be added to make up the deficiency. The author of this test states that he has obtained reliable results with sera which have stood for a week.

*Stern's*¹⁹⁰ modification relies on the presence of the complement in the tested serum to replace guinea-pig's serum in this capacity. The test-tubes are set up in three rows, instead of two, as for the original method, and are therefore in sets of three, those of each set being one behind the other, and devoted to the testing of one serum. The first set receives 0.2 c.c. normal serum in each tube, the second 0.2 c.c. known syphilitic serum, and the remaining sets the same quantity of the sera to be tested respectively. Into each tube in the front row is placed $\frac{2}{3}$ ths the amount of extract which has been found suitable for the test as conducted according to the original method; e. g. if 0.2 c.c. extract has been found suitable for use in the original, 0.08 c.c. of the same extract is used in the front row in this modification. Into each tube in the second row is placed half this quantity of extract, and the back row (control) receives no extract. The quantity in each tube is made up to 2 c.c. by addition of salt solution (0.9 per cent.), and, after being shaken, the tubes are placed in the incubator for an hour. At the end of this time 1 c.c. of a 2.5 per cent. suspension of sheep's red cells which have been sensitized by the addition of nine to twelve doses of amboceptor is added, and they are

replaced in the incubator till haemolysis is complete in the normal serum tubes. No useful purpose would be served by detailing the numerous other modifications which have been introduced, such as Tschernogubow's,¹⁹¹ which makes use of the human blood cells and complement in the patient's blood and anti-human amboceptor, or his later modification, which is similar to Hecht's, but uses guinea-pig's blood cells; Ballner and Decastello's,¹⁹² which follows the original, but uses ox blood cells in the haemolytic system, and Detre and Brezowsky's,¹⁹³ which uses horse red cells.

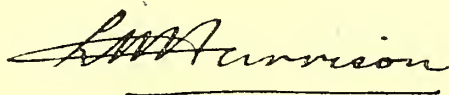
Regarding the modifications which make use of natural anti-sheep's red-cell substances present in human serum, the claim of their respective authors is that they are simpler, and at the same time more delicate than the original method. Their delicacy is undoubted, and this is probably because, for the most part, they make use of unheated serum; their simplicity is a matter of opinion. Personally, I do not think they have any advantage in this respect over the original technique. In any case, the Wassermann test is a laboratory procedure; it is not a test which can be carried out with any reliability by the practitioner in his consulting-room, just as urine is tested for albumen, and to the trained bacteriologist the original technique is sufficiently easy to demand that any simplification shall, at the same time, be endowed with its reliability before it can claim to replace the original method.

On the score of reliability, all these modifications suffer from certain objections, which may be shortly mentioned. In the first place, instead of using complement and amboceptor of uniform strength respectively throughout the series of tests, sera of possibly widely varying content in these substances are compared one with another for the presence of a third substance (syphilitic 'antibody') in the test for which the former are reagents. The test relies on eventual haemolysis or not of blood cells; if amboceptor be deficient in a given serum the minimum haemolytic dose of the complement is raised, and vice versa, so that failure to haemolyse in a tube may be due to deficiency of amboceptor or of complement, or both, in the case of the Hecht technique, or to failure of complement only, in the case of the Stern technique. It is generally argued against this objection that failure

of any of these substances in serum will be apparent in the control (serum and cells), which will fail to haemolyse, but this objection does not hold good in the case of a serum which is deficient, but not entirely devoid of one or both these substances, in the case of the Hecht, or of complement, in the case of the Stern method. In such a case there may be sufficient haemolytic substance in the serum to effect haemolysis in the control, but not enough to withstand the deviating effect of the extract in the other tube. As is well known, extract in the presence of a normal serum will deviate a certain amount of complement, particularly if the serum is unheated. I have seen this happen twice when using the Stern technique, to which these objections naturally apply least; in both cases the sera were normal, but had stood for 48 and 72 hours; both had given a perfectly negative reaction when 24 hours old, but on the later dates, when presumably their complement power had deteriorated somewhat with age, the tube containing extract showed no haemolysis, and in the control tube this was perfect.

On these accounts, if the test is being carried out for diagnostic purposes, I hold that the original method should invariably be adopted, or at least a method in which the constituents of the test are uniform throughout the series. At the same time a modification, such as Stern's or Hecht's, is of the greatest assistance, on account of its superior delicacy, when testing a known syphilitic serum for the effect of treatment.

Of Porges' ¹⁹⁴ reaction (formation of a precipitate on addition of a solution of glycocholate of soda to syphilitic serum), Klausner's ¹⁹⁵ (precipitate on addition of distilled water), and Schurmann's ¹⁹⁶ colour reaction I have no experience, but the evidence is strongly against their value in the diagnosis of syphilis. For the most part, they do not seem to occur so frequently in syphilis as does the Wassermann reaction, and in normal cases or in diseases other than syphilis, they occur far too frequently to make any of them specific in syphilis.



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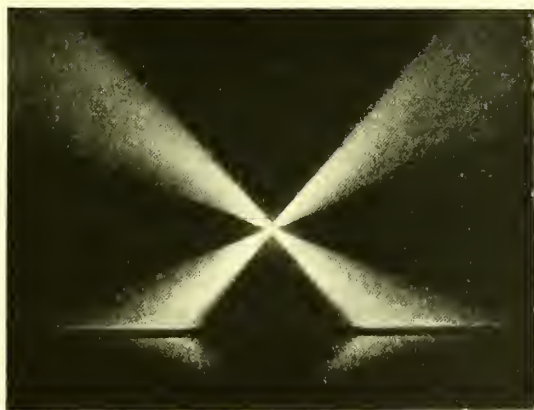
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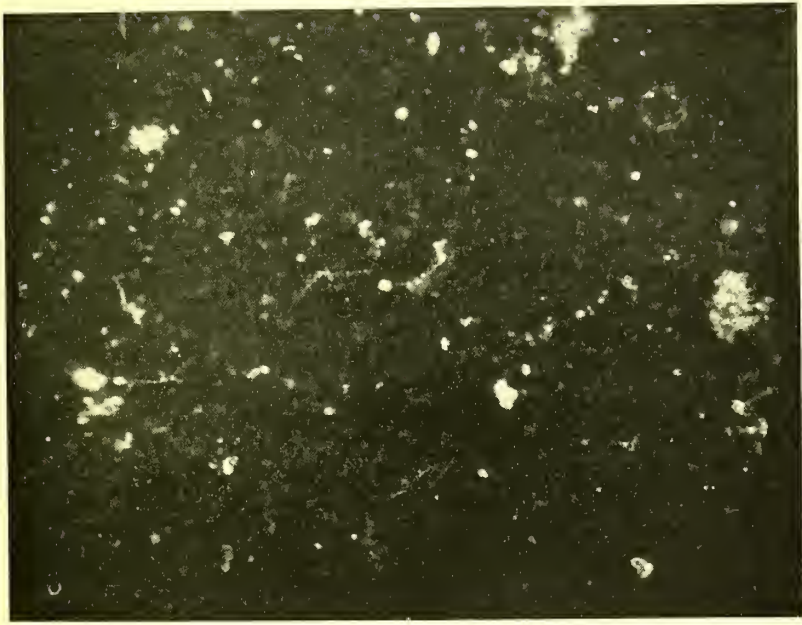
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PLATE III



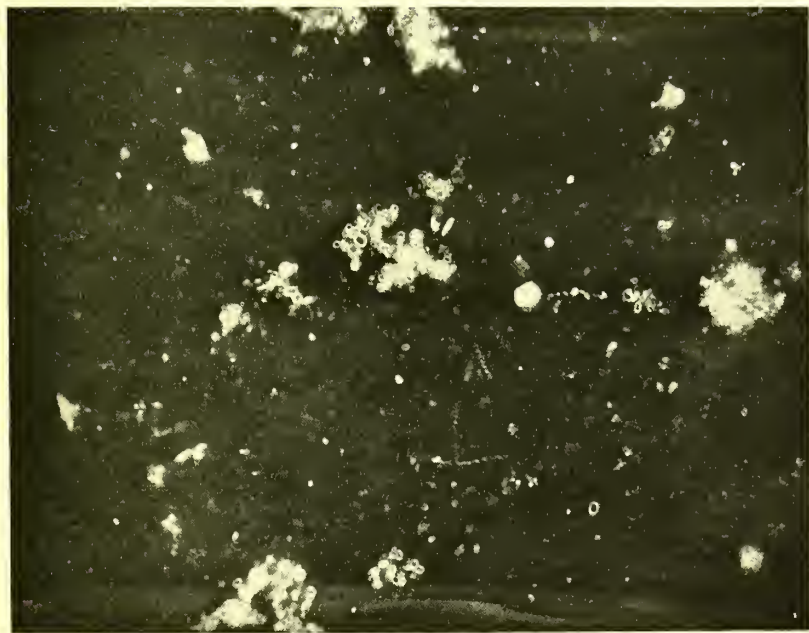
Photomicrograph of the rays from a Leitz Condenser.

PLATE IV



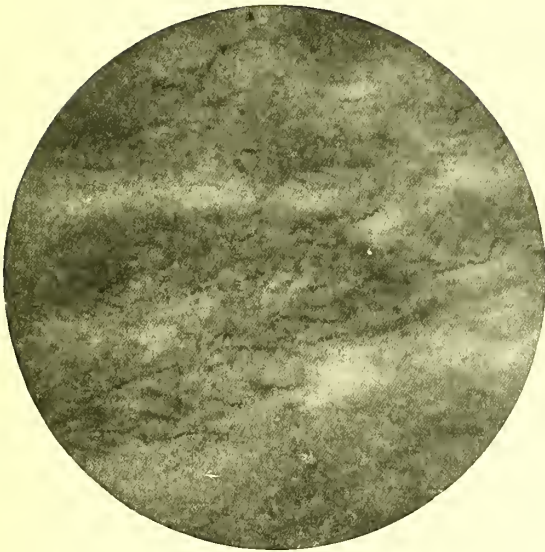
Spirochaete pallida under dark-ground illumination with a Leitz reflector. Photomicrograph of the living organism by Mr. Ogilvy. Magnification 850 diameters. The plate should be examined closely in a good light to see the corkscrew appearance, which is well marked in the left of the two specimens above the centre. In the top right-hand corner is a dehaemoglobinized red cell. The rest of the photograph shows débris and numerous bacteria.

PLATE V



Spirochaete pallida under dark-ground illumination with a Leitz reflector.
Magnification 850 diameters.

PLATE VI



Photomicrograph of section through an ulcer in congenital syphilis,
stained by Levaditi's method. Magnification 1,000 diameters.

CLINICAL COURSE AND TREATMENT
OF SYPHILIS IN THE ARMY

BY

MAJOR C. E. POLLOCK,
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CHAPTER XX

INTRODUCTORY. TYPES OF SYPHILIS IN THE SERVICE

To be accepted as a soldier the would-be recruit must be healthy and between 18 and 25 years of age, which means that his animal passions are fully developed. On enlistment he is drafted to some centre, almost invariably at a distance from his home and friends, and housed in a barrack room with some ten to twenty other young men. Here he is well fed and clothed, his pay furnishes him with a liberal supply of pocket-money, his evenings are his own, he has lost his former friends and amusements, and he no longer has the restraint of home ties. He naturally 'chums up' with some other recruit, and the two sally out to show themselves in their new uniforms and find some amusement for the evening. In the neighbourhood of every barracks there are a number of loose women who, under our laws, are free to earn an immoral livelihood at the expense of the soldier or any one else. A friendly greeting, a little flattery, and the recruit is pleased to accompany his newly-found friend. So much for the recruit at home.

As a young soldier he is sent abroad, probably for the first time in his life. The novel sights and strange women appeal to his imagination, and not infrequently he acquires syphilis as the price of his curiosity.

Again, roughly ninety per cent. of our soldiers must remain unmarried, while on an average each man spends at least half his service out of the United Kingdom. After a time, especially on foreign service, where there is little or no opportunity for him to contract friendships and enjoy the social intercourse of home life, the barrack room becomes very wearisome, while outside temptation in an attractive form always awaits him. It will thus

be seen that the soldier, owing to the special conditions under which he lives, is subjected to considerable temptation, and should he unfortunately contract venereal disease is deserving of much greater consideration than the man who occupies a corresponding position in civil life.

When a soldier contracts syphilis, treatment is compulsory, and for the following reasons rightly so. In the first place, the State provides the soldier with free medical treatment for any ailment; this indeed constitutes a portion of his emolument. Again, it is the duty of the State to return the man to civil life in as good a state of health as when he joined the army, while for the safety of the civil population every endeavour must be made to cure a disease of the nature of syphilis before the man returns to his home and friends. Further, the man has made a contract to serve the State for a number of years, in virtue of which the State has expended a considerable sum on clothing, feeding, and training him for the work of a soldier. If the soldier in the pursuit of his own pleasure acquires syphilis, he must in fairness to the State submit to treatment in order to be made physically fit to fulfil his bargain; were the matter of treatment left to his own choice a man might refuse it, and then claim that he was physically unfit to serve his time, and even claim compensation for loss of health consequent on acquiring a disease to which he was specially exposed by the conditions of army life.

The above remarks will, it is hoped, to a certain extent explain the very considerable differences between the treatment of a soldier subject to military discipline and a civilian who is his own master.

VARIOUS TYPES OF SYPHILIS MET WITH IN ARMY PRACTICE

It may safely be assumed that syphilis is a definite disease caused by a definite micro-organism, but in army practice one is very soon struck by the great variations presented by different cases, both as regards the severity of the manifestations and the clinical course of the disease. This is more especially noticeable among soldiers who are serving abroad, or who have contracted

the disease at one of our tropical stations. Thus we have what may be called—

1. The *ordinary* case of syphilis, in fact the syphilis of textbooks. In these cases a sore appears in from fourteen to forty-two days after infection, becomes indurated, and is followed by the usual signs of the disease; these in turn yield readily to mercury in almost any form, and if the treatment is properly carried out, the disease is eradicated without any particular anxiety being caused, either to the patient or his surgeon.

Much more troublesome than the above is the—

2. *Ill-defined* form. This differs from the ordinary form merely in the fact that the symptoms, though normal, are so feebly marked as to be liable to escape attention, and one is in doubt as to whether the man really has acquired the disease or not. The clinical picture is, to use a photographic simile, under-developed. The explanation of these cases may lie in the inoculation of a very attenuated strain of spirochaete, or more probably in the host having a very high degree of resistance to the virus of syphilis. Cases of this nature are most troublesome, as naturally the surgeon hesitates before diagnosing a disease which involves two years of attendance and treatment, while on the other hand to withhold treatment when a man has acquired syphilis is a very serious responsibility, for these apparently very mild cases if untreated may be followed by the most severe tertiary lesions, a truly grave condition; rather than take the risk of such an occurrence it is well worth the patient's while to put up with the inconveniences attendant upon a two years' course of treatment, even if he does not happen to have contracted syphilis.

3. *Malignant syphilis*. In this class of case primary, secondary, and even destructive skin lesions, somewhat like those of the tertiary stage, may co-exist. The sufferer very rapidly becomes anaemic, wasted, and run down; commonly there is remittent pyrexia, which may be of a severe type. Before the primary sore has healed, the surface of the body becomes covered with a large papular or even nodular eruption, which soon becomes ulcerated or takes the form of rupia (Plates IX and X). At the same time the mucous membrane of the throat and palate is apt to become

sloughy and to be destroyed. The disease, in fact, more nearly approaches the type of an acute exanthem, and runs a rapid and extremely severe or even fatal course. Many explanations have been suggested to account for the occurrence of these fulminating cases, e.g. the debilitating influence of hot climates, the presence of malaria, tubercle, alcoholism, or a double infection with some pyogenic germ and the virus of syphilis. All these would certainly aggravate the severity of syphilis by diminishing the man's resisting power, but on the other hand any one of these may be, and not infrequently is, present at the time of infection, without producing a malignant syphilis, and conversely a malignant syphilis is in my experience more often met with in a young and apparently healthy man in whom none of these accessory factors are present. At home these cases occur most commonly in seaport towns, where the virus of syphilis is constantly being reinforced by strains imported from abroad; at our foreign tropical and semi-tropical stations, where so many of our soldiers put in most of their service, living in the midst of a coloured race, the malignant type of syphilis is by no means rare. We know that the virulence of any particular germ may be exalted by passing it through suitable animals. Syphilis contracted by a native of India or Africa from one of his own race is a comparatively mild disease, but if the British soldier contracts the disease from the same source it not uncommonly takes on the malignant type, and the inference is that by passing it from one race to another the virus is exalted.

4. *Tertiary syphilis.* Tertiary syphilis may be regarded as a normal stage of the disease; here, however, I use the term to denote those cases in which symptoms of constitutional syphilis are found, although there is no record of a primary sore, or, in other words, the cases come under notice for the first time in the late or tertiary stage of the disease. Usually the nature of the trouble is obvious, and the question of diagnosis and treatment presents no difficulty. In some of these cases the original sore was probably not recognized as a syphilitic chancre, but diagnosed and treated as a simple venereal sore. The more susceptible individual soon broke down, and the true

nature of the disease was in consequence early recognized and treated, while the more resistant subjects continued to perform their duty until disabled by the onset of deep-seated visceral or osseous disease.

I have been particularly struck by the fact that the wives of men presenting themselves with unmistakable tertiary lesions rarely report the occurrence of any miscarriages, and that their children do not show any signs of inherited syphilis. One sergeant in particular was undergoing treatment for very extensive gummata of the liver while his wife was delivered of a perfectly healthy child in the military families hospital; the child did not develop any signs of syphilis in the next four months, during which it was under observation.

5. *Obscure syphilis.* These doubtful cases bear the same relation to the tertiary as the ill-defined do to the normal type, and their diagnosis presents great difficulty, even to the experienced syphilologist; indeed in most cases one is forced to rely on the results of the therapeutic test or Wassermann's serum reaction. The signs are usually obscure; the history is mostly negative, or occasionally a venereal sore of unknown character has been contracted years previously. The medical history sheet is rarely of any assistance, as some years ago little trouble was taken to distinguish between the syphilitic and the soft sore, most of the venereal sores being called syphilis, and the notes inserted on the nature and treatment of the lesion were usually meagre and of a stereotyped formula.

CHAPTER XXI

GENERAL REMARKS ON DIAGNOSIS

THE diagnosis of syphilis in the soldier requires greater care than in the case of the civilian ; this will not of course be conceded by the civilian medical man, but in view of the following considerations the claim may perhaps be considered a just one. The man in civil life who is told by his doctor that he has contracted syphilis may believe his doctor or not, just as he pleases ; he may obtain a second opinion from some other source, and, even if he believes that he has acquired the disease, the matter of treatment lies entirely in his own hands, i. e. he can cease to follow his doctor's advice whenever he pleases. In the case of the soldier, however, a diagnosis of syphilis involves being placed on the ' Syphilis Record ' and being under treatment and observation for two years at least. While attending for treatment he is often the object of unfriendly criticism in the barrack room. It is therefore obvious that the soldier has a right to take an active interest in his diagnosis. Occasionally he even objects to it, partly because he does not feel quite convinced that he is being justly subjected to the inconveniences attendant upon this diagnosis, and partly in the desperate hope that he may succeed in persuading a young surgeon to alter his opinion. In addition it must be remembered that the modern soldier is usually an intelligent individual who, to a certain extent, appreciates the serious nature of syphilis. While in hospital with a primary venereal sore he has plenty of time on his hands, some of which is employed in comparing notes with his fellow patients, especially with any one who has recently been diagnosed as syphilitic ; in consequence of his studies he often has a very fair idea as to the real nature of his complaint, and if prematurely diagnosed as syphilitic will make a fairly reasonable objection based on a comparison of his own symptoms with those of other patients who undoubtedly have contracted this disease.

When making a diagnosis of syphilis it is a sound rule to point

out the signs of the disease to the patient, who thus has the opportunity of convincing himself of the correctness of the surgeon's decision, whereby the medical officer will generally secure an active ally in place of a passively submissive or even actively obstructive patient.

DIAGNOSIS

Syphilis can be diagnosed by the pathologist working in his laboratory or by the clinician in charge of the patient. The pathologist bases his diagnosis on one or more of the following tests:—(1) The presence of the *Spirochaete pallida*; (2) a positive serum reaction; (3) changes in the patient's blood under certain conditions.

1. *The Spirochaete pallida.* We have Neisser's authority for saying that the micro-organism of syphilis is always present in any lesion of the disease, and that if the spirochaete is found the disease is syphilis. Unfortunately it is not always easy to find the spirochaete even in a typical lesion of early syphilis by ordinary means, although by recent improved methods it has become simple (see Captain Harrison's article in the present volume, pp. 140–53), and in old lesions, or those occurring in the late stages of the disease, the most skilled workers rarely succeed in demonstrating this organism. If found, the presence of syphilis may be taken as proved, but should the surgeon fail in his search for it, he is not justified in concluding that the patient is not suffering from syphilis.

2. *Wassermann's serum diagnosis by complement fixation.* The great objection to the general adoption of this reaction for the purpose of proving the presence of syphilis or otherwise is the rather delicate and complicated technique involved. This has been described by Captain Harrison in the present volume (see pp. 180–99). Neisser states that a positive reaction is proof of the presence of syphilis, although the converse does not hold good. In apes, as well as in man, a positive reaction may be obtained within sixteen days of infection, i.e. some time before the primary sore has developed.* By the time that the primary sore has

* McDonagh states that in very early primary lesions of syphilis a positive

appeared, the spirochaetes have invaded the whole system, forming fresh centres and damaging the vitality of the tissues. A positive reaction, if obtained early, before this dissemination has taken place, permits us to begin energetic treatment and to kill off the micro-organisms before they have invaded the body generally. Experience in the treatment of trypanosomiasis has shown that early treatment is essential if a successful result is to be obtained.

3. *Changes in the blood.* It is extremely doubtful if any reliable information, or at least anything sufficiently reliable to permit us to form a diagnosis, will ever be obtained from the changes in the patient's blood occurring as the result of infection with syphilis, or after the administration of any form of treatment for syphilis. Justus's blood-reaction has been repeatedly shown to be unreliable (see pp. 499-505). Lévy-Bing states that syphilis causes a reduction in the number of red blood corpuscles, the percentage of haemoglobin, and the quantity of iron in the blood, while the lymphocytes are increased. After injections of mercury the number of red blood corpuscles and the percentage of haemoglobin are increased, the lymphocytes being reduced in number. Lévy-Bing states that these changes do not occur in non-syphilitic patients under the same conditions, and that the changes are so constant in character as almost to permit of a diagnosis being formed from them. It must be remembered, however, that these examinations of the blood require delicate manipulation by an experienced worker, otherwise the results are most misleading.

Clinical evidence. The clinician forms his diagnosis after considering the following:—(1) the history, (2) the initial lesion, (3) the condition of the lymphatic glands, (4) the state of the skin and mucous membrane, (5) other signs or symptoms, (6) the therapeutic test.

reaction is rare, and only occurs in some 30 to 40 per cent. of patients who have an actual hard sore. Further on in his article he mentions that leprosy has been found to give a positive reaction; if this is confirmed it detracts considerably from the diagnostic value of the test. Campbell draws attention to a reaction practised by Dr. Porges, in which serum is heated to 56° C. for half an hour with an equal quantity of a freshly prepared solution of sodium glycocholate; on standing for twenty hours a flocculent precipitate is formed in syphilitic cases; this is compared with a control tube.

1. *History.* Most men are first seen when the sore has no definite character, and the interval between exposure to infection and the appearance of the sore is usually stated to be seven to ten days. This is probably correct, the explanation being that the man has contracted both a soft chancre and syphilis, the latter only becoming apparent at a later date.

Not uncommonly a man will present himself with a typically indurated sore, but on questioning him as to the date of his exposure to infection, it is found that the risk has been incurred on several fairly recent occasions, hence it is impossible to fix the date on which infection took place.

Occasionally a man reports sick when the disease is well into the secondary stage and his body is covered with a copious papular eruption. In such a case he generally denies having noticed any sore. This may be true, but more often he has deliberately failed to report himself as sick, hoping that the chancre would disappear without treatment; when compelled to go to hospital he naturally states that he has not seen any sore, as if he acknowledged having done so he would render himself liable to punishment for having concealed his disease.

It is really in the later lesions of syphilis, and especially those of ill-defined character, such as tumours of the internal organs, that a history of previous infection would be of great assistance in forming a diagnosis, but it is just in these cases that the history so often fails us. A few years ago it was the custom of some medical officers to call every sore 'primary syphilis', as this simplified the returns; their notes on the nature of the lesion and its treatment were also invariably characterized by brevity and a military uniformity, hence their study is of little or no help to us. The patient's account of himself and his disease is rarely of any assistance. In short, in the army very little reliance can be placed on the history as an aid to the diagnosis of syphilis.

Inspection of the patient. Having obtained any assistance we can from the man's account of his malady, we pass on to the inspection of the patient. The army surgeon should train himself to a routine plan of examining each new case. One is naturally inclined to be satisfied with merely looking at the particular

manifestation, on account of which the man is seeking advice, but if this habit be acquired much interesting or even valuable information may be missed. Patients rarely think it necessary to mention more than a single symptom, say, the sore, although examination may reveal the presence of swollen inguinal glands, or even a well-developed eruption.

The following plan answers all ordinary requirements :—One corner of the inspection room is screened off to ensure privacy. Each man in turn steps behind the screen with all his buttons undone so that he can expose the whole body in a moment. The surgeon first inspects the sore, and then, having dipped his fingers into some antiseptic solution, palpates the lesion with his forefinger, not pinching it between his finger and thumb, as this is most misleading to the touch ; he then examines the lymphatic glands, beginning with those in the groins. Using both hands he should carefully palpate these, employing a little pressure, and noting particularly if they have the typical resilient feeling of the syphilitic gland ; from the groins he should pass on to the epitrochlear and cervical glands, running his fingers downwards along the sterno-mastoid muscle. Then standing at least a yard away from the patient, he should inspect the front of the body, especially the upper abdominal region. A syphilitic eruption, if faint, is better seen when the skin is cold. When artificial light has to be used faint syphilitic rashes may escape detection ; these are rendered more distinct if inspected through cobalt blue glass. The palms of the hands and finger-nails should not be forgotten. The patient should then turn round, to show his back and the soles of the feet ; he should next be told to stoop and separate the buttocks ; the scalp should be examined for alopecia, and the eyes for iritis or other lesion. Lastly, the patient is told to open his mouth ; the medical officer, using a tongue depressor, holds the lips away from the gums so as to expose both surfaces of the mucous membrane ; the tongue is then looked at, and finally the throat. This is reserved till the last, as it is not very pleasant for the patient, and is very liable to cause an explosive cough with the expulsion of possibly infective matter. This routine examination, if regularly practised on each new case,

can be done in a very short time, and the surgeon has the satisfaction of knowing that very little can have escaped him.

2. *The initial lesion.* In the great majority of cases the first clinical sign of syphilis is the hard sore, but because a patient when first seen only shows a soft sore, it by no means follows that he has not contracted syphilis. A double infection with the Ducrey-Unna bacillus and the *Spirochaete pallida* is not at all uncommon; the soft chancre appears in a few days, while the syphilitic chancre requires from fourteen to forty-two days, or even longer, to attain its typical character. Unless microscopical examination of the fluid expressed from the deeper portion of the sore reveals the presence of the spirochaete, and so definitely proves the syphilitic nature of the chancre, it is wiser to regard every venereal sore as a potential syphilitic infection until the absence of further manifestations in, say, three or four months, shows that we have only a soft chancre to deal with. The fact of a sore being hard does not necessarily prove that it is a syphilitic one, as a soft sore if sufficiently irritated with caustics becomes infiltrated with inflammatory products and acquires a certain degree of 'hardness', sufficient at least to mislead the unwary.

The 'hardness' depends on the amount of syphilitic infiltration which has taken place. This infiltration is a small-celled invasion of the coats of the lymphatics and smaller blood-vessels; hence where these are numerous, as in the corona, the sore presents a cartilaginous feeling when palpated; where the vessels are less abundant, as in the skin, the induration is almost imperceptible to the touch, and we get the 'parchment' chancre. Pure syphilitic infection has no tendency to ulcerate, and in this case we get the prominent smooth surface of the Hunterian or button chancre. There is always more or less ulceration when other germs, such as the Ducrey-Unna bacillus or the common pyogenic cocci, have been inoculated, either simultaneously with the spirochaete, or subsequently introduced by friction against the clothing. Chancres on the skin almost always become more or less infected with pyogenic germs, hence they are usually ulcerated and inflamed; this is especially so in the case of a chancre near the finger-nail, when the purulent discharge and inflammatory pain

often cause it to be mistaken for a whitlow. Chancres of the buccal mucous membrane, on the other hand, being constantly bathed in saliva (which probably acts as a fomentation), show little inflammatory change, and may easily escape detection. From the above remarks it is obvious that the appearance of the chancre may vary considerably, according to its situation and the nature of the infection.

3. *Lymphatic glands.* The group of lymphatic glands nearest to the sore become affected soon after the appearance of induration in the chancre. We usually find the lymphatic glands in both groins typically enlarged, because the commonest site for the sore is on the penis. As is well known, a large number of different causes may lead to a lymphadenitis, but there is no other disease which produces the typical enlargement of the syphilitic gland. The young surgeon should take every opportunity of palpating these, since it may almost be said that syphilis can be diagnosed in the dark merely by feeling the glands. The condition of these is, in the author's opinion, of quite as much value in forming a diagnosis as that of the primary sore.

In the usual case of a chancre situated on the penis, this characteristic change is found in a chain or group of glands in each groin; these used to be described as 'bullet' or 'amygdaloid' glands. 'Bullet' would seem to convey an exaggerated idea of their hardness. The glands are discrete, freely movable, and when pinched impart a resilient feeling suggestive of a solid rubber tyre. The remaining glands of the body at the same time become affected, but their condition is more corroborative than primarily diagnostic.

The true syphilitic gland does not suppurate, but as the chancre frequently has a broken surface, pyogenic germs may gain entrance, and so produce a condition of inflammatory enlargement in one or more glands, which may even go on to suppuration. Should one groin be so affected, the condition of the other will usually give the desired information. The elongated, tough, and chronically enlarged gland, so commonly found in healthy men, must not be mistaken for the rounded resilient gland of syphilis.

The condition of the glands just above the elbow lying on the triceps tendon is of little value, as they are constantly found enlarged in healthy men. The cervical glands, again, are liable to become swollen from a variety of causes, without any suspicion of syphilis, and in definitely syphilitic subjects their condition is often not at all typical, and may afford no information. Sometimes, however, they are found in typically enlarged chains on either side of the neck.

The most reliable information is always to be obtained by examining the group of glands situated nearest to the sore.

4. *Skin*. In many cases it is unnecessary to wait for any eruption before forming a diagnosis of syphilis. When the early rashes of syphilis first appear they are often quite atypical, and in the absence of other signs may mislead the surgeon (Plate VIII). On one morning I saw four consecutive cases of this kind, and showed them to four experienced army surgeons, who pronounced against a diagnosis of syphilis. During the next three weeks all of these patients had developed typical eruptions.

The commoner skin manifestations of early syphilis are :—

(1) The erythemata, generally described as roseolar or macular syphilides (see also vol. v, pp. 37–43). These are of a pink or ‘raw ham’ colour, and appear first on the upper abdomen and corresponding area of the back. They may be very faint and escape the patient’s notice. In looking at these the surgeon should stand at least a yard away from the patient and keep him stripped long enough for the skin to become slightly chilled; the vessels in the healthy areas of skin contract under the influence of cold, thus making the normal skin pale, while the arterioles affected by the spirochaete and supplying the ‘rash’ spots are much less involved, consequently the difference between the healthy and diseased areas becomes accentuated.

(2) The papular syphilide may be of the small or large variety (Plates VII and VIII), and may vary considerably in colour (see also vol. v, pp. 48–63). This form takes longer to develop than the erythematous one, and likewise persists for a longer time, frequently, in spite of treatment, leaving pigmented staining of the skin for some months. If untreated the papules

may become scaly or form vesicles, which in turn may become pustular and form scabs or crusts, or even small ulcers.

(3) The follicular syphilide (see also vol. v, pp. 63-64). This may be of the large or small variety, and is usually not so deeply pigmented as the papular form. The small variety tends to occur in circular groups, often with a large follicle in the centre ; it is very resistant to treatment.

(4) Malignant syphilis. In cases of malignant syphilis the skin manifestations are always very pronounced and may be of several forms. A common eruption consists of large deeply pigmented nodules closely covering nearly the whole surface of the skin. *Rupia* occurs specially in malignant syphilis (Plates IX and X). Extensive superficial ulceration of the skin is also met with, but is probably really due to a secondary infection with pyogenic organisms. All these eruptions may be present before the primary sore has begun to resolve.

(5) Syphilis may imitate any one of the well-defined non-syphilitic eruptions of the skin, but if carefully examined it will always be found that the distribution or some other equally important feature of the disease is abnormal. These counterfeit diseases occur especially in cases which have had only a limited and insufficient amount of treatment.

Without entering upon the differential diagnosis of syphilitic and non-syphilitic rashes, it may be remarked that in tropical countries where our soldiers spend a good deal of their service, toxic rashes and parasitic affections of the skin are more common and more pronounced than at home. They may be mistaken for syphilis, or, on the other hand, may temporarily mask a syphilitic eruption, and must accordingly be watched till their disappearance is complete.

(6) *Gummata*. These may occur as large, firm, or even hard masses in and underneath the true skin. Sometimes they resemble a cold abscess, but on puncture are found to contain a gelatinous substance looking like melted glue. More commonly they are first seen after necrosis has occurred and ulceration has set in. The callous bluish margins, sharp cut edges, and sloughy yellow base are unmistakable.

Mucous membranes. The mucous membrane may be affected at any stage of syphilis, the most troublesome lesions, however, being those which occur when the secondary stage is well advanced. Particles of decomposing food, left adhering to the teeth, appear to act as a powerful predisposing cause; this is probably to be explained by the vitality of the mucous membrane being lowered in consequence of its being exposed to continuous poisoning by the products of decomposition. Excessive smoking seems to affect more particularly the fauces, soft palate, and tonsils, while the local irritation caused by sharp teeth, holding pipe-stems or cigarettes, and blowing musical instruments produces patches on the tongue and lips.

The syphilitic lesions of the mucous membranes are :

(1) An erythema of the soft palate and fauces occurring about the same time as the skin eruption.

(2) The mucous patch on the tonsils, fauces, tongue, or lips, the frequency being in the order mentioned. The typical early patch is rounded or oval, and sharply differentiated from the surrounding healthy membrane; its surface is smooth, shiny, and with a characteristic transparent pearl colour on an underlying pink base. This lesion if present is pathognomonic of syphilis, and is very contagious. It must not be confused with the patch of thickened epithelium frequently found just inside the angles of the mouth, and caused by the irritation of a sharp tooth: the distinguishing features of this non-syphilitic patch are that the surface is not smooth and shiny, the colour is a dead white in the centre, and the margins gradually shade off into healthy tissue.

(3) Somewhat later in the course of the disease large hypertrophic papules may be met with; these are covered with epithelium, and are apparently caused by a syphilitic infiltration of the submucosa.

(4) The converse condition is also met with during later stages of the disease, viz. bald patches from which the epithelium has been shed.

(5) Chronic glossitis, with deep fissuring of the surface surrounding paler smooth areas, is found in late syphilis, especially in heavy smokers and spirit-drinkers.

(6) In late cases which have had a good deal of treatment, one sometimes finds small elevated yellowish areas of dead epithelium ; they are found at the site of constantly recurring irritation, e. g. where a pipe-stem usually rests. These are very refractory to treatment, yet, so far as I know, are not found in non-syphilitic subjects. What their significance is I cannot say.

(7) *Gummata*. In late syphilis, especially when the treatment has been insufficient, gummata of the tongue, fauces, palate, lips, or even of the glans penis are found. On the tongue or end of the penis the common lesion is a deep punched-out ulcer having a sloughy base ; in these positions the lesion readily responds to treatment. On the palate and fauces the tendency is to cause great destruction of all the tissues with perforation of the hard palate, and if not energetically treated at an early stage, to leave very considerable and permanent deformity.

(8) Where much tartar is allowed to accumulate on the bases of the teeth the mucous membrane has a great inclination to recede and form painful and destructive ulcers. This is really a form of stomatitis, and not directly due to syphilis, but is much aggravated if syphilis is present ; the patient naturally ascribes his trouble to syphilis or mercury, or any cause other than the true one, viz. deposits of tartar on the teeth, coupled with insufficient cleaning.

(9) *Condylomata*. These are not really affections of the mucous membrane, but occur on the skin surrounding the anus, and on the scrotum, concurrently with lesions of the mucous membranes, and seem naturally to fall into the same group.

Condylomata occur in two forms, condylomata lata and condylomata acuminata. The latter are really warts, and appear to be caused by the decomposition of secretions, especially of those of the preputial glands, although they are met with on the anus and perineum. It is extremely doubtful if they have any connexion at all with syphilis.

The broad condyloma, on the other hand, is pathognomonic of syphilis ; its moist shiny surface and broad base make it easily recognizable, and absolutely distinct from the moist red papillomatous non-syphilitic condyloma. Intertrigo of the anus may

be mistaken for syphilitic condylomata if hurriedly glanced at. On looking carefully at intertrigo, it is seen to consist of masses of sodden white epithelium, lying on the natural ridges of the anal folds, with small superficial ulcers in the hollows between.

5. *Other Signs of Early Syphilis.* (a) *Body-weight.* In nearly every case of early syphilis there is a slight but progressive loss of body-weight, commencing when the chancre begins to indurate and continuing till treatment is begun; during treatment the body-weight steadily increases up to a certain point. Some men being particularly robust and having only acquired a mild syphilis do not suffer any appreciable loss of weight; probably the decrease depends on the degree of interference with metabolism which the micro-organism produces.

(b) *Anaemia and alterations in the blood.* Among soldiers serving at home or in a cool climate, it is rather the exception to find any degree of anaemia recognizable by the naked eye. In Malta, during the beginning of the hot weather of 1908, a large number of men contracted a very severe form of syphilis, mainly from one woman. In all of these there was marked pallor around the eyes, together with a clearly recognizable general anaemia.

(c) *Pyrexia* of a mild remittent type is fairly common during hot and debilitating weather in foreign stations.

(d) *Headache.* This symptom, again, is not very common among soldiers. Possibly because the soldier, a picked healthy man, and in general leading an open-air life, has more resistance to the debilitating influence of syphilis.

(e) *Arthralgias.* A definite synovitis, or merely pain in and around the joints and fasciae of the limbs, may occur in early syphilis, especially in damp localities; these pains are always worse at night.

6. *Therapeutic Test.* A certain number of obscure cases are met with in which the question arises, is the lesion a remote result of syphilis? Careful examination, as a rule, yields no definite evidence of syphilis. It is most improbable that any spirochaetes would be detected, and failure to do so is of no value in forming a diagnosis. The serum test might, if available, settle the doubt,

but if not we must fall back on the therapeutic test. Before applying this the urine must be examined to exclude nephritis ; if possible, too, the haemoglobin should be estimated, and the body-weight recorded. Some energetic form of mercurial treatment is then to be used for at least a fortnight. I prefer injections of calomel, $\frac{1}{2}$ grain twice a week, together with iodide of potassium by the mouth. A decided improvement in the general symptoms, together with an increase in the body-weight, justifies a diagnosis of syphilis. A slight improvement affords no reliable information.

CHAPTER XXII

TREATMENT. MERCURY, ARYLARSONATES, IODIDES, ETC.

IN spite of the recent introduction of the arylarsonates for the treatment of syphilis, mercury still holds its own as our chief remedy ; we know its great efficacy, and thoroughly appreciate the risks entailed by its use, which can hardly as yet be claimed for the arylarsonates. Experience has shown that certain precautions must be observed if we wish to minimize the risk of unpleasant complications when prescribing mercury in full doses.

PRECAUTIONS BEFORE A COURSE OF MERCURY

Before commencing the treatment of syphilis by mercury we must be sure that the man is in a fit state to benefit by the drug, and while taking it he must be watched to see that it is doing good and not harm.

The first and most important precaution is to ascertain that the kidneys are performing their functions properly. Mercury and arsenic are mainly eliminated from the body by the kidneys, and to a lesser extent by the intestinal glands. If the ordinary clinical examination of the urine fails to detect albumen or sugar the kidneys may be assumed to be healthy. If albumen is present the percentage should be determined and noted to enable us to gauge the effect of treatment. Albuminuria may be produced by (1) Nephritis, (2) Syphilis, (3) Functional derangements.

1. If nephritis be suspected, further examinations of the urine and of the patient must be made to settle the question. When nephritis is definitely present *no mercury* is to be given ; if there is any doubt on the matter a tentative dose of say one-quarter of the usual one, or even less, may be given, preferably by the mouth, and a daily examination of the urine made to

note the effect. If full doses of mercury are prescribed for a patient suffering from nephritis the surgeon must be prepared for serious mercurial poisoning, or even a fatal result.

2. When albuminuria, not due to nephritis, is present, the first dose of mercury, in whatever form administered, should be not more than one-quarter of the usual full dose. After a few days the urine should be again tested quantitatively for albumen. If this was due to syphilis a rapid diminution and total disappearance of the albumen will be found, in which case the ordinary treatment can be carried out.

3. Functional albuminuria is not of much consequence; it demands, however, a much more careful watch on the urine, any increase of the albumen being an indication to reduce the dose or entirely to suspend the administration of mercury.

As regards the alimentary canal, if the man has served abroad inquiries should be made as to any recent attack of dysentery, liver abscess, or tropical diarrhoea. If there is any history of recent attacks a reduced dose should be used at first till we are sure that the mercury will not induce fresh intestinal irritation.

Teeth. Textbooks lay great stress on the advisability of extracting all stumps before giving mercury. Soldiers, however, do not take very kindly to the suggestion that, say, half a dozen stumps which are not causing them any pain should be extracted merely as a preliminary to taking mercury. Provided the stumps are kept clean they do not give rise to any stomatitis, whereas healthy teeth, if neglected, certainly will do so.

Smoking. Excessive smoking of cheap cigarettes with inhalation of the fumes generally leads to more or less inflammation of the mucous membranes. It is very difficult to induce soldiers to give up the habit, but sometimes one can persuade them to limit the number of smokes to, say, one after each meal.

Alcohol. The ordinary subject of syphilis is better without any alcohol; it is, however, in many cases difficult to persuade the soldier that this is so, as many of them have an idea that beer is 'strengthening' and necessary to their well-being. An old soldier who has habitually consumed as much alcoholic

refreshment as he could procure, makes a very bad patient, should he be unfortunate enough to contract syphilis; in such a case a daily pint of stout with his dinner may, with advantage, be allowed.

PRECAUTIONS DURING A COURSE OF MERCURY

When the patient's excretory organs are performing their functions properly the precautions necessary during a course of mercury are limited to a few common-sense observations.

1. At each attendance the body-weight must be noted. This is our easiest and most reliable guide as to the effect of treatment on the patient. Any persistent drop in weight should arouse suspicions that all is not well with the patient. The urine should, in this case, be examined at once, and if any albumen is found no more mercury is to be given. If the urine is normal the other organs must be examined. Thus in one case in which a steady drop was noticed the real cause turned out to be phthisis, which had not been suspected previously. In other cases we find that the man has begun training for some athletic competition, or, again, many men lose weight at the beginning of the hot weather.

2. It is a sound rule to examine the urine at regular intervals, as this gives early indication of the fact that the maximum safe quantity of mercury has been administered.

3. During the early courses the whole body should be looked over at intervals, especial attention being bestowed on the lymphatic glands nearest to the sore. These should have returned to their normal condition after a month or so of energetic treatment; any persistent enlargement remaining after this is to be taken as an indication that the disease has not been effectively attacked, and an extra course of mercury or calomel cream injections should be added to the routine plan.

4. The mucous membrane of the mouth and throat is to be examined at each visit, as it is here that fresh manifestations most commonly occur and might possibly lead to infection of other men in the barrack room.

5. A general glance at the man's condition to note anaemia,

signs of excessive drinking, &c., should be made a routine habit.

6. Some system must be devised to ensure the regular attendance of all patients ; this will be referred to later.

ACTION OF MERCURY

When the spirochaete obtains a foothold in the human body it commences to multiply, and while doing so, it produces both toxins and antitoxins.⁴ The presence of the various manifestations of the disease is certainly due to the toxins. The production of antitoxins is not so evident, but we know that in some cases the primary sore, and even the early secondary rashes, may disappear spontaneously. May we not reasonably assume that this is due to the antitoxins having been formed in sufficient quantities to neutralize the toxins, and so lead to a temporary recovery ?

How does mercury cure syphilis ? Presumably by neutralizing the toxins, and so permitting the antitoxins to act in the destruction of the virus. To neutralize the toxins a definite quantity of mercury, varying somewhat for each case, is required. At present we have no means of accurately gauging this amount, and must therefore rely on a working plan drawn up from the results of observations on a large number of cases, checking the effect of this in each case by the rough and ready test of ascertaining the man's body-weight, any drop in which shows that sufficient mercury has been given. If more mercury is introduced than is necessary we get the poisonous effect instead of the curative one, and this by interfering with metabolism prevents the continued formation of antitoxins. The one fact to remember is that the treatment of syphilis does not consist merely in administering mercury in as large quantities as the patient will tolerate. At the same time, Ehrlich's work on trypanosomiasis⁶ shows that the initial attack on the disease must be vigorous, as a mild prolonged treatment merely has the effect of producing a strain of virus capable of resisting the drug employed. Clinical observation endorses Ehrlich's work, as among the most troublesome

cases met with are those who have undergone a mild treatment during the early stages of the disease.

Whatever plan is adopted the following rules should be borne in mind :—

1. The initial course should be energetic.
2. The body-weight must be taken before each injection, or once a week if other plans of treatment are employed.
3. Intervals of non-treatment must be interposed between the courses, to allow of the elimination of the drug and products of the micro-organism.
4. The subsequent courses need not be so energetic as the first one, but must be arranged for at regular intervals to prevent the recrudescence of the disease.

WHEN TO BEGIN AND HOW LONG TO CONTINUE MERCURY

As soon as a definite diagnosis of syphilis can be made energetic treatment should be commenced. The sooner the spirochaete is attacked the less time it has to multiply and cause damage to the tissues. If the surgeon begins treatment in a doubtful case of syphilis he must continue it till he has carried out what he considers to be a full course. A small quantity of mercury will postpone the symptoms indefinitely, and lead to a false sense of security, which is roughly dispelled by the appearance of late and possibly grave lesions.

Neisser's experimental work on apes¹ suggests the possibility of cutting short the disease at its commencement, by the use of arylarsonates, but at present we have not sufficient evidence that this result can be attained, and the surgeon who attempts to carry out this treatment must keep the patient under careful observation for years, as otherwise he is assuming a considerable responsibility. In time, as our acquaintance with the life-history of the spirochaete becomes more intimate, we may be able to eradicate the disease by some simple plan of treatment, instead of the present troublesome and lengthy administration of mercury for two or more years. We have, however, considerable evidence to support the claim that this treatment does cure the great majority of cases,⁵ and it would seem wiser to adhere to this plan till we know that some simpler one can be relied on.

HOW LONG TO CONTINUE MERCURY

The present army practice is to continue the administration of mercury for at least two years ; this period embraces several long intervals of non-treatment. Before being struck off the syphilis register the man must have been free from all manifestations of the disease for at least twelve months. From the army point of view, this plan yields very satisfactory results. Only some 5 per cent. of the men undergoing treatment suffer from fresh manifestations necessitating a readmission to hospital. This means that the loss of efficiency due to syphilis is small. About 1 per cent. of the men have to be replaced on the register after having been struck off as cured, but in almost every case it will be found on examining their syphilis sheets that these men have either concealed their disease and so not begun treatment till late in the secondary stage, or else that they have been very irregular attendants. The question of complete cure is extremely difficult to answer. The men pass from the ranks into the reserve and thence into civil life, being thus lost sight of, so that there is a possibility of a man suffering from tertiary manifestations long after he has left the army. I have been told, however, by a member of the staff of a large Lock Hospital, that, since the introduction of the injection treatment in the army, the number of old-soldier patients has very greatly decreased.

Neisser¹ and Fournier still advise a total treatment extending over four years. This is no doubt an excellent counsel, but it would be very difficult to carry it out in the army, owing to the frequent moves both of medical officers and men. With all due respect to these eminent authorities, I think we may for the present be satisfied with two years' thorough treatment.

TREATMENT. GENERAL REMARKS

When considering the treatment of syphilis in the army it must be borne in mind that the conditions of the soldier's life are very different from those of the civilian's, and that consequently what may be excellent treatment and easily carried out for the civilian may not be at all suitable for the soldier, and vice versa.

Thus the civilian chooses his own doctor and pays for the advice given, or at some trouble to himself attends a hospital; in any case, he is making some sacrifice in order to obtain advice and treatment; consequently he values the advice, and takes the treatment as directed, or if not satisfied he can either change his medical man or even give up treatment altogether. A soldier, on the other hand, not only obtains the advice and medicine free, but is obliged to accept it, and for as long as his medical officer thinks right; he cannot voluntarily change his doctor, but for service reasons often has to submit to a change. It is therefore necessary to proceed tactfully if the treatment is to be successfully carried out without arousing feelings of resentment.

Before beginning treatment, I always point out to the man the signs of the disease, thus letting him convince himself of the necessity for treatment, and at the same time explain to him that treatment must be maintained for at least two years, if he wishes to avoid having relapses years after leaving the service, when he is earning his living in civil life. A useful point is to impress on the man that if he evades treatment while in the army the medical officer does not suffer but the man himself will; this makes more impression on the average man than any other exhortation. The great majority try to attend regularly.

Any plan of treatment adopted for the army should be simple, so that in the not unusual event of a medical officer being moved to a new station his successor can carry it on without interruption.

The treatment must be efficient. The men attend at the same time and see each other's progress; any large proportion of failures would soon be followed by a general disinclination to submit to further treatment. The method of treatment should be as far as possible painless, as, if not, the man has a good reason for objecting to it.

The successful working of any plan depends to a large extent on the co-operation of officers commanding units; if they enforce attendance the medical officer is saved much worry in hunting up absentees. Commanding officers do not like losing the services of their men more often than is necessary, hence the plan selected

should not take up more of the soldier's time than is absolutely necessary. The same applies to the medical officer's time. It is only in a few of the large stations that the medical officer has not several other duties to perform as well as looking after the syphilis out-patients.

Courses. Dividing the treatment into definite courses during which mercury is administered, and intervals of rest, appeals to the soldier. He can nearly always tell what course he is on and take a certain amount of interest in noting when one finishes and the next is due.

The same medical officer should, if possible, always see and treat the men. In addition to the mutual knowledge and confidence which result from this, it enhances the importance of the malady and its treatment; the men appreciate being treated by the 'Professor Doctor', as the specialist was nicknamed in Malta.

METHODS OF ADMINISTERING MERCURY

A short description of the various ways in which mercury can be used in the treatment of syphilis, with special reference to the advantages and disadvantages of each from an army point of view, will now be given.

1. *By the mouth or the internal method.* Treatment of syphilis by means of pills and mixtures is a favourite plan with British and French practitioners, and in civil life the results appear to be satisfactory. It must, however, be remembered that the civilian patient, as mentioned in the previous chapter, voluntarily seeks treatment for syphilis, and is naturally anxious not to become incapacitated from earning his livelihood, a serious matter for him; consequently he endeavours to carry out faithfully the instructions given him and usually does so with a happy result. On the other hand, a soldier with active syphilis is placed in hospital, where although he suffers some loss of pay he has no anxiety as to the necessities of life. If, while in hospital, the surgeon elects to treat him with pills or mixtures the stay in hospital must be considerably prolonged, as this form of treatment is not an energetic method of attacking the spirochaete.³⁰ A soldier in hospital is an encumbrance and expense to the

State besides throwing his share of duty on to others, hence it is desirable to shorten the stay as far as possible. In the case of a soldier out of hospital but still undergoing treatment for syphilis by the internal plan, the difficulty is to ensure that the medicine is regularly taken by him. When he no longer feels any pain or sees any sign of the disease he begins to think that he is cured and becomes very careless about taking his medicine. If the pills are given him to take in the barrack room he seldom does so; if, on the other hand, he is made to attend once or oftener daily at a hospital, a great deal of his time is taken up which should be spent in the performance of duty. Failure to take his treatment leads sooner or later to a readmission to hospital, but this is a small penalty for his neglect.

At one large station a list of men who were to attend daily for medicine was kept in the dispensary, and each man when he could find time to spare from duty was supposed to attend and take his medicine, ticking off his name to show that he had done so. The plan appeared to work well till one day a commanding officer sent to ask how many men were really attending hospital, as he had not a sufficient number for parade. Inquiry revealed the interesting fact that the men had arranged themselves in squads, one man from each of these being deputed to attend daily and tick off all the names, the whole of them then being free to enjoy themselves for the rest of the morning. At another large station the medical officer inspected the men once a week and supplied each of them with enough pills to last for the ensuing week; in this case there was constant trouble owing to the blocking of the waste pipes with mercurial pills. I merely quote these instances to show the difficulty of carrying out daily medication in large stations.

As regards the actual treatment Sir Jonathan Hutchinson⁷ advises small doses more or less frequently repeated, and never large ones, e. g. 'one grain of hydrargyrum cum cretâ, combined if necessary with one grain of Dover's powder every six, four, three, or even two hours, according to circumstances; . . . usually one pill four times a day will suffice to clear away a chancre or secondary eruption as rapidly and as completely as can be

wished.' This scheme of treatment could be carried out while the man is in hospital, but hardly as an out-patient if the soldier is to do any duty at all; even while in hospital the frequent dosing detracts very considerably from any advantages which the scheme may possess.

The advantages of this plan of treatment may be briefly summed up: (1) Little trouble for the medical officer, who merely has to prescribe. (2) Does not soil the clothing. (3) Freedom from pain.

The disadvantages are numerous, the following being the principal ones: (1) Frequent dosings add to the work of the sick attendants. (2) Liability to cause diarrhoea, colic, or even ptyalism, especially so in tropical climates. (3) The quantity of mercury absorbed is liable to great variations in different people. (4) The grave form of syphilis acquired in tropical countries will not yield to this form of treatment.

For the routine treatment of syphilis in the army this plan offers few advantages and many disadvantages and cannot be recommended. In certain selected cases it may be used to replace the later courses of injections, when, on account of the nature of the man's employment, these are objected to. The disease must, however, have been brought completely under control in the early stages and have shown no fresh manifestations, also the man must be intelligent and capable of being trusted to take the medicine as ordered. Again, there are a few men in whom a full dose of mercury is at once followed by a considerable degree of albuminuria. These men have to be treated with very small doses of mercury, and this may be arranged for by making use of pills, say, one once or twice a day, the effect being watched till a suitable dose has been found.

Another small group of cases consists of old soldiers whose syphilis has been very inadequately treated at the beginning and who suffer from mild tertiary symptoms many years later, possibly when occupying important positions as senior non-commissioned officers. They naturally dislike the idea of being placed on the register and having to attend with a lot of young

soldiers, but can usually be trusted to take medicine in their own houses, in this way being treated and in course of time probably cured, without loss of dignity.

(For formulae see Appendix I, pp. 274-277.)

2. *Inunction*. Inunction³⁰ is one of the oldest and, when properly carried out, one of the most efficacious ways of treating syphilis. Professor Neisser in his latest paper on syphilis¹ still recommends one course of inunctions in order to destroy the spirochaetes in the skin, although in view of his own statement as to the universal distribution of the spirochaetes in all the organs it is difficult to understand why this method should be superior to intramuscular injections. To obtain the best results the following points should be attended to:—

(1) The skin of the part to be rubbed should be soft and clean. This condition is attained in Aachen and other Spas by means of a bath lasting about half an hour in the natural hot water of the locality; the Aachen water contains a large percentage of sulphur and common salt. Sulphur is one of the best skin antiseptics, hence the bath fulfils the double function of destroying a large proportion of the germs living in the skin as well as removing the dead epithelium and remains of the previous day's inunction, thus producing a clean soft surface ready to absorb the ointment when rubbed in. Quite a good substitute for the natural sulphur water can be prepared by adding two to four ounces of *Liquor calcis sulphurata* to an ordinary hot bath. Failing facilities for a general hot bath the hands of the rubber, as also the skin about to be rubbed, must be washed in hot water before commencing; the part treated on the previous day should also be washed to remove the remaining ointment. Any preparation rubbed with dirty hands into a dirty skin will produce a sharp attack of dermatitis. A different site should be selected for each daily rubbing; thus the calves on the first day, the thighs next day, then the abdomen followed by the skin of the forearms, and finally that of the back. In this way each part rubbed has four days' rest before the next rubbing; hairy parts should be avoided owing to the pain caused and the great liability to dermatitis.

(2) *Dosage.* The average daily dose should be about 20 grains of metallic mercury made up into an ointment ; 40 grains of unguentum hydrargyri (B.P.) mixed with 20 grains of lanoline and wrapped in wax paper forms a convenient dose which can be handed out to each patient. Several attempts have been made to introduce mercurial soaps and glycerine creams for use in inunctions, but so far none have been found to be superior to the old-fashioned ointments.

(3) The actual rubbing is of great importance. At Aachen and the various centres devoted to the treatment of syphilis, special trained rubbers are employed, who in Wiesbaden use a glass ball instead of the hand for rubbing in the ointment. The provision of trained rubbers would probably prove too expensive for military hospitals, and as a matter of fact is not really necessary, as the patients can easily be taught to rub themselves, and, provided they are kept under the supervision of a reliable non-commissioned officer while doing so, the result is quite satisfactory.

The skin having been prepared, and if the weather is cold the patients seated in front of a fire, each man is served out with a packet containing the mercurial ointment and the time noted. The rubbing should last at least twenty minutes, the ointment being rubbed in slowly, using considerable pressure ; at the end of the twenty minutes the skin should look dull and grey, not shiny, although a few skins do not lose their greasy appearance even when the inunction is properly performed. In these cases it is quite possible that little of the ointment is absorbed through the skin, but that the mercury is volatilized by the heat of the body and inhaled during the succeeding twenty-four hours.⁸ When the rubbing is finished the class should be inspected by the medical officer, to see that the inunction has been properly performed, before being dismissed to wash their hands, a necessary precaution before eating the next meal.

(4) *Clothing.* The clothing is bound to suffer, hence old or special sets should be kept for these cases ; the men should wear the same underclothing day and night for a week, then have a clean set for the next week.

(5) The usual course of inunctions is forty-two, one daily for six weeks. This means either that the man must remain in hospital for forty-two days after being diagnosed, or if discharged to his barracks he must give up at least one hour daily to receiving his treatment. The treatment of out-patients by means of inunctions can be carried out in small numbers, but on a large scale it would involve a great deal of trouble and some expense in providing hot water for washing.

The advantages of the inunction treatment may be briefly summed up as : (1) efficient, (2) painless. The disadvantages from a military point of view are : (1) time in hospital must be at least forty-two days in every case ; (2) requires constant supervision while being carried out—this means an extra attendant in the syphilis ward ; (3) cost of providing hot water for washing ; (4) soiling of underclothes ; (5) uses a large quantity of ointment, roughly $3\frac{1}{2}$ ounces of the unguentum hydrargyri (B.P.) for each man for each course ; (6) not suitable for the treatment of out-patients.

INTRAMUSCULAR INJECTIONS

This plan of treatment meets army requirements to a much greater extent than any other, and the British army is indebted to Colonel Lambkin for having so strenuously advocated its adoption. Many varieties of soluble and insoluble preparations of mercury and its salts have been successfully employed for intramuscular injections. Each of these has some special advantage, the real explanation being in all probability that syphilis can be cured by almost any preparation of mercury, provided the surgeon is familiar with the disease and its treatment.

Before mentioning any special preparation it is well to consider the plan of treatment by injections generally. The advantages are :

1. The dosage is accurate and absolutely under the surgeon's control. When a pill is given, even if it is swallowed, we have no means of knowing how much of the mercury enters into the man's circulation ; similarly, if we rub ointment on to a man's skin, a certain amount is always found adhering to it next day ; we do not know how much of the mercury has been absorbed by the skin, how much has been volatilized, and of this volatilized

mercury how much has been inhaled by the patient and how much by his neighbours. Critics of the injection treatment may quite reasonably point out that although the mercury has been introduced into the tissues by the syringe it does not follow that it enters the circulation ; this state of affairs may happen, but when the proper precautions have been observed it is quite exceptional, and I may say that I have never met with an example in many thousands of injections.

2. The antisyphilitic effect is rapidly obtained and is maintained for some time, thus permitting the man to attend to his duty while active treatment is automatically continued.

3. It does not require many attendances, hence it hardly interferes at all with the performance of duty by the soldier, and if the necessary apparatus is laid out previously, the medical officer can deal with a large number of men in a short time, being free to attend to his other duties.

4. The method is popular among soldiers, who appreciate its benefits.

The disadvantages of the intramuscular injections are—

1. The medical officer must himself give each injection, which means a little trouble for him and soiling of his fingers.

2. There is a slight risk of producing fat embolism, mercurial poisoning, and septic trouble at the site of injection ; with ordinary care these are very unlikely to occur.

3. Pain ; this varies greatly according to the preparation used : with mercurial cream it is only slight, and does not deter any man from having the treatment.

All of the preparations used fall into two main divisions, viz. Soluble or Insoluble ; the latter includes metallic mercury and its insoluble salts.

The Soluble Salts

Many preparations have been advocated by different authorities ; the best collective description is given by Lévy-Bing.³ He says the most active and least painful are biniodide, hermophenyl, lactate, and benzoate, the biniodide being by far the most useful of all the soluble salts. My own experience has

been limited to the perchloride, which in the absence of mercurial cream I have found to be very useful and not to produce diarrhoea, &c., as stated by Lévy-Bing.

All solutions of the soluble salts for injection should be made in normal salt solution which has been filtered, as common salt almost always contains a certain proportion of dust which if injected will give rise to painful induration.

Advantages. The soluble salts possess certain definite attractions, the principal ones being that the solution can be prepared in a few minutes, and being strongly antiseptic no sterilization is necessary. Being a watery solution it can, on an emergency, be injected with any hypodermic syringe, and there is no danger of producing a fat embolism; the injection also rapidly exercises a powerful antisyphilitic effect. The perchloride can be carried in tabloid form ready to dissolve. On board a troopship or on active service serious cases of syphilis are occasionally met with; in the absence of any other preparation for injection the perchloride solution can be prepared and injected, constituting for the time a very active form of treatment.

Disadvantages. In spite of the advantages which the soluble salts offer for what may be called the 'occasional' treatment of syphilis there are many objections to their routine use in the army.

In the first place, the quantity of mercury which can be introduced at any one injection is small. Taking the perchloride, one of the best and certainly most readily obtained in the army, the largest dose that can be safely given is one-third of a grain, and this only contains one-quarter of a grain of metallic mercury, which is roughly equivalent to one day's dose in the early stages of syphilis. The chlorides of mercury are very active, but it is the metallic mercury which effects the cure; hence in order to introduce a sufficient quantity of the metal we must give a larger number of injections.

The injections of the soluble salts are always more or less painful, frequently very much so, and I have known many soldiers object to injections of the perchloride for this reason, but who willingly took injections of mercurial cream. The necessity for

frequently repeating the injections and the consequent pain would seem to prevent this plan of treatment from ever becoming a success in the army.

INSOLUBLE PREPARATIONS OF MERCURY

These include the insoluble salts and emulsions of the metal. The great advantage common to all of these is that a relatively large quantity of mercury can be introduced at a single injection, so that the soldier need not be absent from duty for more than a couple of hours at comparatively long intervals.

The disadvantages are two, viz. that owing to the high specific weight of mercury and its salts it is difficult to prepare a stable emulsion sufficiently fluid for injection, and that if carelessly used an overdose may be injected with unpleasant or even fatal results.

Insoluble Salts

Lévy-Bing³ gives a long list of insoluble salts which have been used for intramuscular injection in syphilis, but of these only two deserve mention, viz. calomel and the salicylate.

Calomel. With the possible exception of the intravenous injection of soluble salts the intramuscular injection of calomel is the most rapid method of obtaining an antisymphilitic effect, hence its great value in grave cases of syphilis. Until lately the great drawback to the injection of calomel was the pain, occasionally extremely severe, which followed its use. Another objection was the difficulty of obtaining a good emulsion, for if too fluid the calomel at once falls to the bottom of the vessel and not uncommonly becomes deposited in the needle, which it temporarily blocks. Both of these objections have to a great extent been overcome by Colonel Lambkin. The addition of 'Creo-Camph' greatly reduces the pain, while the consistence of his cream is such, that by placing the jar in hot water for a few minutes the cream becomes semifluid; vigorous shaking will then mix the calomel thoroughly and it is ready for injecting. If allowed to become too fluid the palmitin base will not keep the calomel in suspension; a large proportion of the salt sinks to the lowest part of the barrel of the syringe and is consequently not injected.

The needle must be dipped into the heated oil bath between each injection to keep it warm and prevent temporary blocking of the lumen, which occurs when the needle is cold owing to the cream in it becoming solid. Injections of calomel are always inclined to excite local irritation, hence all the antiseptic precautions mentioned under mercurial cream injections must be carefully observed. In two cases I have found an abscess at the site of a calomel injection; in both the pus was sterile and there were none of the usual signs of septic inflammation.

The effects of calomel injections are not so lasting as those of the mercurial cream, and this is probably to be explained by the fact that $\frac{1}{2}$ grain of calomel, which is a usual dose, only contains approximately $\frac{2}{5}$ of a grain of metallic mercury. Calomel acts rapidly and energetically on syphilitic manifestations; lesions which will not yield to any other form of treatment often do so when a course of four weekly injections of calomel is given. Taking into consideration the greater liability of calomel injections to be followed by local irritation, and the fact that its effect is not so lasting as cream, I am strongly of opinion that its use should be reserved for cases in which a rapid and powerful antisymphilitic action is desired, and that it is not suitable for the routine treatment of syphilis. Mucous patches in the mouth and throat will generally yield to a couple of calomel injections, although in these cases I prefer to give an extra course of four calomel cream injections in addition to the usual number of courses of mercurial cream injections.

Salicylate of Mercury

This salt, which is largely used in Germany³⁰ for the injection treatment of syphilis, is not nearly so active as calomel or mercurial cream, but the injection is rarely painful. It is most suited for use in the later courses of treatment when the disease has been brought under control by one of the other preparations, but it can be used for the routine treatment of syphilis at any stage of the disease. Its special advantage lies in the fact that it can be more easily suspended than the other heavier salts; 10 grains of the salt, finely ground, added to 100 minims of fluid

vaseline or other neutral medium and well shaken up makes a sufficiently good emulsion for injection. This mixture, which can be boiled, in order to sterilize it, without undergoing any change, would therefore appear to offer certain advantages for use at small stations situated in the tropics, distant from the conveniences of modern civilization, and in which there are no facilities for keeping creams cool and so maintaining their proper consistency.

The ordinary dose is 1 grain a week, and as the salt contains roughly 60 per cent. of metallic mercury this dose represents rather less than $\frac{2}{3}$ of a grain of metallic mercury, or about half the usual dose given in an injection of mercurial cream, so that if used in the treatment of early syphilis at least two injections a week should be given.

*Mercurial Cream*⁹

This preparation, originally introduced by Lang of Vienna in 1886 and in the British army associated with the name of Colonel Lambkin, more nearly fulfils the requirements of army practice than any other which has as yet been suggested.

The special advantages offered by mercurial cream are : (1) the injection is less painful than any other ; (2) next to calomel it is the most active form of mercurial treatment ; (3) a relatively large dose can be injected at a single injection, the mercurial effect being thus maintained for some considerable time ; (4) the preparation being concentrated a small bulk suffices for many injections ; (5) as compared with inunction it is inexpensive, as little more mercury is required by this method for the entire treatment of a case of syphilis than is used for each inunction.

Mercurial cream consists of metallic mercury reduced to a state of very fine subdivision and evenly suspended in some neutral medium. This medium or base must be non-irritating and not likely to become acid or rancid ; it must be sufficiently viscid to keep the heavy molecules of mercury in suspension and yet fluid enough to allow the cream to pass through a needle. These conditions can be easily fulfilled for any given temperature ; a fall of several degrees of temperature will, however, make the

cream too stiff to pass through a needle, while a rise of, say, ten degrees will make the medium so fluid that the heavy particles of mercury sink to the bottom. As long as the grains of mercury have not coalesced into globules the cream merely requires vigorous stirring before use, in order to redistribute the particles of mercury evenly throughout the mixture. The substance which has been most generally used in order to obtain the necessary degree of subdivision is lanoline, one of the paraffins being subsequently added in order to obtain the strength required. The melting-point of lanoline is 105° F., that of the paraffins used in the preparation of creams being very much lower; by varying the proportions of lanoline and paraffin a cream which shall be fluid and stable at any required temperature can be prepared. As the atmospheric temperature varies very considerably at different times of the year different creams would have to be prepared to suit the different seasons. This can, however, be obviated by having a cream which shall be ready for use at the highest temperature likely to be met with, as it is a comparatively simple matter to warm the cream up to any given temperature merely by placing it in a jar of warm water for a few minutes; the converse, namely to keep a cream at a temperature lower than that of the atmosphere in order to maintain its stability, is a most troublesome matter. Colonel Lambkin has recently successfully introduced palmitin as a base for mercurial and calomel creams; palmitin being a constituent of the human body, and otherwise fulfilling the required conditions, offers a considerable advantage in the preparation of creams for injection.

When the cream has been standing for some days the heavy particles of mercury always tend to sink to the bottom, the upper layers of the cream consequently containing too little and the lower layers too much mercury; hence before use the cream must always be well stirred.

The cream should be of moderate concentration; no advantage is gained by making a bulky injection, and this is more likely to irritate the surrounding tissues by making pressure on them; the action of lanoline or other base is purely mechanical and in no way curative.

Lang's¹⁰ original formula, which contained 30 per cent. by weight of mercury, is too concentrated, rendering it very difficult to measure a small dose accurately. One grain of mercury in five minims of cream is a good working strength, as it permits of a half, one, or one and a half grains of mercury being injected, and does not necessitate so many refillings of the syringe when a number of men have to be treated. Colonel Lambkin's new formula (see Appendix I) is claimed to be painless owing to the addition of 'Creo-Camph'; this hardly seems to be necessary for mercurial cream.

One of the greatest desiderata in the army is to have all the creams clearly marked with the number of minims which contain 1 grain of metallic mercury; if possible only one strength of cream should be used, as medical officers, orderlies, and patients are all liable to frequent changes of station; consequently if creams of different strengths are in use mistakes in dosage are likely to occur. The dose given should also be recorded in grains of mercury injected and not in minims of cream.

When using the cream care should be taken not to allow dust to get into the jar, and any glass rod used for stirring the cream should be previously passed through the flame of a spirit lamp in order to burn off the cotton filaments adhering to it. Foreign matter of this nature, if injected intramuscularly, is certain to give rise to more or less painful induration.

Dosage. This question has been thoroughly investigated by Barthélemy and Lévy-Bing in Paris.³ As a result of their work I adopted a dose of $1\frac{1}{2}$ grains of mercury as the standard injection. I have used this dose for the last five years and as yet have found no reason for altering it. I have never observed any sign of over-dosage. By using a fairly large dose, such as $1\frac{1}{2}$ grains of the metal, we are enabled to make a vigorous attack on the disease in the early stages, while in the later courses longer intervals can be allowed between each injection, thus economizing the soldier's and the medical officer's time. Syphilis can be equally well treated by using a smaller dose, say 1 or even $\frac{1}{2}$ a grain of mercury, but the injections must be more frequently given, thus taking away one of the principal advantages of this plan of treatment.

Syringe and needle. An all-glass syringe with platino-iridium needle of moderately large bore is almost a necessity for injecting cream. The syringe should have a capacity of at least three, or better four doses ; this obviates the necessity for constantly refilling the syringe when a large number of men have to be treated ; a larger capacity than 40 minims is not convenient, as the graduation is too coarse and it is difficult to measure a small dose accurately. Before beginning the injections the syringe and needle are to be thoroughly sterilized by drawing up olive oil heated to 120° C. several times ; this at the same time washes away the copper salts which form in the brass cap of the needle. Between each injection the needle is to be dipped into the heated oil, partly to resterilize the point and also to wash away the drop of cream which nearly always exudes from the needle, and which if deposited in the true skin causes considerable irritation. The needle must not be sterilized by heating it in the naked flame, as this melts the soldering and ruins the needle. Sooner or later the solder is taken up by the mercury and the seam of the needle opens, allowing the cream to escape all along the track and into the true skin ; the point also forms a minute V at the bevelled edge which makes a painful puncture ; the needle should therefore be looked at before using it to see that it is in good condition, and never be put away with cream in it.

Preparation of the skin. Before making any injection the skin is to be rendered as far as possible aseptic by removing the dead epithelium with the adherent germs. If this is pushed into the skin by the needle septic inflammation is sure to follow. A simple and effective way of preparing the skin is to rub it vigorously with sal-alembroth wool well moistened with methylated spirit till a red blush appears ; an orderly can be employed to do this while the medical officer is giving the injection.

Site of injection. In order to avoid puncturing large vessels it is best to select the upper part of the buttock, keeping about the level of the junction of the gluteal folds, beginning on one side and taking the other on the following week, avoiding as far as possible the exact site of a previous injection. Lang¹⁰ advises the spinal muscles in the upper thoracic region, making the injec-

tion about one inch from the middle line and on alternate sides. I tried this, but did not find it popular with the British soldier. The suprascapular fossae or even the deltoids may be used for a patient confined to bed. A good general rule is to avoid muscles which are subject to free movements, e. g. those of the thighs.

Technique. Inspect the needle carefully to see that the point is sharp, not bent or split, and that the seam has not opened; also that the needle is firmly fixed in its cap. Next sterilize the syringe and needle in boiling olive oil and lay them to cool on a piece of 'glass' cloth or towel which has been dipped in 5 per cent. carbolic acid lotion. Then take a glass rod, and after passing it through the flame several times proceed to stir the cream thoroughly; in doing this the jar should be held on its side and the cream be whipped up so as to get the lower portion, which is sure to be too rich in mercury, intimately mixed with the upper layers which have lost their proper proportion of the metal. In cold weather the cream should be placed in a bowl of *tepid* water for some minutes before it is required. By using tepid or only slightly warm water we avoid any chance of spoiling the cream by overheating.

The syringe can then be filled and the needle attached and re-dipped in the heated oil; the skin having been meanwhile prepared by the orderly, the surgeon now selects a spot, avoiding pimples which bleed freely when punctured, or hairs which might be driven into the skin by the needle, and plunges the needle to its full extent vertically into the tissues. The syringe is then detached for a few seconds, when, if a vein has been penetrated, the contents of the needle slowly ooze out and blood begins to flow; if this happens the needle must be withdrawn and another site selected. An injection made into a vein is almost certain to produce a fat embolism with somewhat alarming results, although these will all clear up in a few days. If no vein is struck the injection may be completed and a little collodion brushed over the puncture; this is not really necessary, and usually I merely have the puncture rubbed over with the sal-alembroth and spirit swab. Most soldiers believe that a brisk walk helps to prevent any after-pain.

After-effects. The non-septic sequelae are:—

1. Occasionally rather free oozing of blood from the skin-puncture occurs. A collodion dressing is the best way of dealing with this.

2. If cream is deposited in the true skin a very painful nodule is formed, which lasts some days and then clears up.

3. In almost all cases about the fourth day after the injection the man has a slightly bruised feeling where the cream was deposited ; if palpated a small nodular swelling can be detected ; this usually disappears after three or four days.

4. Rarely a painful induration may form and last for a couple of weeks without any signs to suggest the presence of sepsis. This condition is almost certainly due to the introduction of dust or cotton filaments with the cream.

5. Very rarely an injection causes neuralgia of the great sciatic nerve, lasting about a week ; this is probably due to the injection being deposited in one of the nerve filaments.

Septic sequelae. 1. A superficial septic infection produces a boil-like swelling of the true skin ; if untreated this breaks down, leaving an indolent ulcer.

2. When sepsis occurs in the subcutaneous or muscular tissues an abscess of varying size and severity is produced. If the abscess is small its contents may sometimes be removed by aspiration, no further treatment being necessary. A large abscess requires the usual surgical treatment.

Schemes of treatment. Alternative schemes are given in Appendix II. When selecting or drawing up a scheme of treatment, the principle which Ehrlich⁶ demonstrated in his work on trypanosomiasis should be borne in mind ; viz. the initial attack must be a vigorous one, the subsequent courses being milder and given at definite intervals. If only moderate doses are used at the beginning the result is to acclimatize the germ to the drug and produce a drug-proof strain which is hardly if at all influenced by further treatment. When using an energetic method of administering mercury, such as is the injection of cream, it is most necessary to allow of definite intervals of rest after each course of treatment. When all the free spirochaetes have been destroyed no good is done by giving more

mercury; on the contrary, positive harm ensues, as is evidenced by the loss of body-weight and anaemia. The schemes given have been drawn up to suit the ordinary man; it does not follow, however, that they will suit every case of syphilis, and the courses or intervals may be shortened according to the needs of any particular case. An interval of at least two months must be allowed to elapse after each course of mercury.

There are many other ways of administering mercury, and they are described in vol. ii of this System. The chief amongst them are intravenous injection^{12 13}; calomel vapour baths, a plan of treatment associated with the name of Mr. Henry Lee, whose apparatus was, at one time, supplied to all military hospitals; Welander's mercurial bag, and mercurial baths.¹⁴

ARYLARSONATES

These were first introduced as *atoxyl*, and it was claimed that in this form a large quantity of arsenic could be injected without any danger of producing arsenical poisoning. Owing to the success which followed its use in trypanosomiasis, experiments were made with it in the treatment of syphilis. Published reports as to the effect of the drug varied considerably, but on the whole, and more especially in France, the verdict was favourable. In a certain number of the cases treated by *atoxyl*, symptoms of poisoning attributable to its use were noted, the chief one being optic neuritis followed by total blindness; these accidents occurred more frequently when the *atoxyl* was obtained from one special source and contained impurities. In consequence the employment of *atoxyl*, in England at least, has now been given up in favour of some of the later arylarsonate preparations. The salt which seems to have been most largely employed is sodium-para-aminophenylarsonate, called by the makers, *soamin*. In Germany, Ehrlich has introduced several arylarsonate preparations, one of which, *arsacetin*, is favourably spoken of by Neisser.¹ Judging by the progress already made, it seems highly probable that even better preparations will be available in the near future.*

* *Treatment.* In the München. Med. Wochenschr., No. 11 of 1910, Alt has an article on two of the recent arylarsonate preparations. He obtained very good results with arsenophenylglyzin (which must be kept in vacuum tubes till

Soamin contains 22.8 per cent. of arsenic, and the makers claim that it has only one-fortieth of the toxicity of arsenious acid. It is soluble in five parts of cold, or three of warm water ; the solution must be freshly prepared and warmed to body temperature before being injected ; the injection is best made into the gluteal muscles, and is generally painless or, at most, only slightly so for a few minutes. The solution is incompatible with the heavy metals, acids, or quinine. This must be borne in mind, as the salt must not be given simultaneously with mercury, an interval of at least fourteen days being necessary ; * neither can it be given by the mouth, as the gastric juice decomposes it.

Colonel Lambkin^{16 33} and Major Ward¹⁷ have given the best accounts of the use of soamin in the treatment of syphilis. Much work must be done before we can say definitely how soamin should be administered in order to get the best effects from it, and some years of careful observation will be required in order to enable us to judge of the permanency of its effects.

In his later cases, Colonel Lambkin injected 10 grains on alternate days till a total of 100 grains had been introduced. In 30 cases which were treated in this way he did not observe any toxic effects in spite of the large dose. Another series of 25 cases received 60 grains each and remained free from all symptoms for eight months. This is a remarkable success in the treatment of syphilis, and quite justifies Colonel Lambkin's concluding remark that in soamin we have a second specific for syphilis. Arsenic is, however, a very powerful drug, and it seems a little risky to introduce such large quantities even in a non-toxic form. Further experience may very probably suggest a smaller dose, say 5 grains in each injection, and limiting the course to a total of 50 grains ; this course might be repeated after an interval of a month or so.

immediately before use), giving 0.8 grm. on two successive days and no more. The patient's organs must be in a healthy condition. Even better results were obtained with Dioxydiamidoarsenobenzol, which is sent out as the Ehrlich-Hata '606' preparation. It is dissolved with the aid of caustic soda, and eusemin is then added as an anaesthetic ; the dose is 0.3 grm. ; the injection is stated to be very painful.

* Col. Lambkin³³ has recently employed arsacetin simultaneously with mercury and reports very favourably on this practice.

Dangers of Aryl-arsonates. In the 'British Medical Journal' of March 5, 1910, Ernest Lane has written a warning of the serious sequelae which may follow the administration of aryl-arsonates ; he mentions four cases in which total blindness supervened after a course of orsudan or soamin.

Colonel Lambkin has also used arsacetin (sodium-acetylphenyl-arsenate) in 15 per cent. solution, injecting 40 minims (equal to 8 grains) every alternate day till a total of 100 grains is reached. The solution requires warming before use, but does not undergo decomposition if kept for a time ; this fact, together with its low toxicity, renders it, in Colonel Lambkin's opinion, the most useful of the arylarsonates which we at present possess. Major French does not speak so favourably of the arylarsonates, as he found the effect to be transient and rarely so satisfactory as that of mercurial inunctions.³⁵

My own experience with soamin in early secondary syphilis has been somewhat disappointing, especially with lesions of the mucous membranes. In the later stages of syphilis, especially in the case of men who had contracted the disease in India, the value of soamin was undoubted. I injected $7\frac{1}{2}$ grains on alternate days for three weeks ; in every case there was an immediate rise in body-weight, the average gain being a stone in the three weeks, while the syphilitic lesions at the same time rapidly cleared up ; treatment was then continued by mercury and the iodides.

Many attempts have been made to cut short syphilis in the earliest stages by injecting arylarsonates. In 1907 Metchnikoff³⁴ stated that three injections, each containing 10 grains of atoxyl, prevented any further developments in cases of undoubted syphilitic chancre. In order to test the value of this statement Colonel Lambkin arranged that every second man admitted with any venereal sore into certain of our larger military hospitals should receive four injections, each containing 10 grains of atoxyl or soamin. The carefully recorded results showed that this treatment did not in any way prevent further developments.³³

Neisser¹ states that even after full infection with syphilis animals can be cured by the use of atoxyl or arsacetin, but that man does not tolerate atoxyl to the same extent as the ape.

Hallopeau ³¹ reported very encouraging results from the daily injection of 10 cg. of atoxyl into the tissues between the chancre and the lymphatic glands, or into the glands themselves.

Further experience has shown that some of the arylarsonates can be administered at the same time as mercury. Colonel Lambkin has recently treated a large number of cases with atoxylate of mercury with excellent results and no unpleasant sequelae.

The present position of the arylarsonates in the treatment of syphilis may, I think, be summed up as follows :—

1. They exert a powerful curative action on syphilis at all stages of the disease, but are inferior to mercury.

2. In men the arylarsonates do not cut short syphilis, however early the administration is begun.

3. They should be of great value for patients who cannot tolerate mercury, or in whom mercury fails to exert a curative action.

4. For those patients whose syphilis has been contracted in the tropics, and who, in consequence of residence in unhealthy and malarious countries, have become seriously debilitated, the arylarsonates should prove of the greatest value.

5. Judging by the results obtained in the treatment of trypanosomiasis the arylarsonates should be employed in conjunction with mercury.

IODIDES

In the army the iodides are most commonly prescribed as iodide of potassium, or sometimes as iodide of sodium or ammonium. The first salt is supposed to be specially depressing, the other two less so. The real explanation of the *depression* is, I believe, that the salt has been given in full doses for long periods without allowing any interval. If ordered for not more than fourteen consecutive days a better therapeutic effect is obtained without any depression. In some people iodides produce dyspepsia; a tumblerful of water taken half an hour before meals will generally relieve this. Susceptible individuals may develop symptoms of iodism. The coryza may often be arrested by

doubling the dose, while the eruption may be got rid of by adding five drops of liquor arsenicalis to each dose. Lieven³⁰ recommends 15 grains of sulphanilic acid daily in 7 ounces of water in cases of severe iodism.

Should the administration of iodides by the mouth be contra-indicated for any reason they may be prescribed in the form of an enema, 1 drachm of the salt dissolved in 4 ounces of water being ordered once daily after the bowels have acted.

Iodides may be successfully employed to relieve the headache which often occurs in the pre-eruptive stage of syphilis. The iodide of ammonium, or the iodide of potassium combined with carbonate of ammonium, is most useful at this time.

In the secondary stage, when lesions of the mucous membranes are present, a short course of the iodides will greatly hasten their disappearance. In view of Neisser's statement¹ as to their curative action, it seems almost advisable to give every case under treatment for early syphilis a course of iodides. The value of the iodides in promoting the absorption of gummatous lesions is well known, but the fact that this action is greatly enhanced by the addition of mercury, provided this has not been recently given in full doses, is not always recognized. The old army 'Mist. Specific', containing 10 grains of the iodide of potassium and a drachm of solution of perchloride of mercury with decoction of cinchona, is an excellent remedy for late tertiary lesions of a mild type found in patients who have been imperfectly treated in the early stages. Given for fourteen days in each month for one year as a 'tonic' it often works wonders.

Iodipin. In some of the more serious tertiary lesions, involving nervous system or bone, iodides prescribed in mixtures are often disappointing. For these cases injections of iodipin should be tried. Iodipin is a compound of iodine and sesame oil prepared in 10 and 25 per cent. strengths; the latter is for injection. It is a thick oily fluid, and requires warming before being injected. From 2 to 4 drachms should be injected daily for seven to fourteen days, according to the severity of the case. Being very expensive it should be reserved for special cases which have failed to benefit from the salts of iodine prescribed in the usual way.

Iodipin was originally introduced by the makers as a non-depressing and absolutely safe preparation of iodine. Its greatest merit is, however, in my opinion, the power which it has of attacking highly resistant forms of tertiary syphilis, which do not yield to the ordinary methods of prescribing iodides. This is probably due to the fact that the iodine is much more loosely combined with the oil than in the case of an alkaline base, and that in the body it is slowly liberated in an active or nascent form; iodine can be detected in the urine for months after an injection of iodipin, and it seems quite open to question whether any advantage is gained by using the enormous quantities which have been advocated by some of the German authorities.

Iodoglidine is a combination of iodine and albumen: it is stated to be non-depressing, and as it is stable it can be carried in tablet form. I have no experience in its use, but it might be of service for patients who cannot tolerate iodide of potassium and who object to the bulky injections of iodipin.

Tincture of iodine has been used, ten to thirty drops being given in wine or coffee. It is inclined to cause gastric irritation and seems to have little to recommend its use.

Iodoform in pill has been found useful in some rare cases. It is very irritating, and its use should be reserved for those cases in which all other forms of iodide have failed.

INJECTIONS OF QUININE

Lenzman,³⁶ believing that an increase in the number of leucocytes is accompanied by an increased production of antibodies, endeavoured to induce this condition by injecting quinine. He treated altogether 14 cases in various stages of the disease, injecting 0.5 to 0.8 gramme of quinine hydrochloride daily for seven to ten days. In some of the cases he used a special preparation of nucleinic acid and quinine, injecting this intramuscularly at night, and the hydrochloride intravenously in the morning. Lenzman reported a marked improvement by the third day, and a disappearance of all signs soon after the treatment was completed.

Hermann Napp¹⁸ treated 22 cases. On each of the first two

days he injected 0.5 gramme of the hydrochloride of quinine intravenously, and the same on alternate days afterwards till eight to ten injections had been given. In some cases there was slight and very temporary nervous disturbance. The results were very good. Neisser¹ agrees that quinine exerts a curative influence on syphilis, but does not give any details.

This treatment might be of great value in India or some of our tropical possessions.

TARTAR EMETIC

Ward¹⁷ reports that injections of antimony were tried in two cases, but had to be given up on account of the pain. The treatment seemed to have a beneficial effect.

Broden and Rodhain¹⁹ report two cases of syphilis in negroes, who were treated with 10 cg. of tartar emetic injected intravenously for ten successive days. The lesions rapidly healed.

SARSAPARILLA

This drug had at one time a great reputation in the treatment of syphilis, but in England it seems to have fallen into disuse. In March 1906 Professor Allbutt²⁰ and others again drew attention to the value of fresh infusions of sarsaparilla in the treatment of syphilis. Professor Lang¹⁰ of Vienna treats all his grave cases of syphilis with a concentrated decoction of sarsaparilla alone for the first fortnight, and with excellent results.

The essential is to have a freshly prepared infusion of the root. I have used the formula given in Appendix I, p. 274, in Malta for the last two years with very satisfactory results. The preparation is palatable and in cachectic patients it exercises a decidedly beneficial effect. Iodide of potassium can be added to each dose, if desired, and forms an excellent adjuvant to mercurial injections in the more severe cases of early syphilis.

ZITTMANN'S TREATMENT

This form of treatment is only rarely required for the British soldier who is doing garrison duty, but is most useful for debilitated men returning from the tropics, especially if suffering from

extensive syphilitic lesions of the skin.²⁴ The formula is given in Appendix I, p. 275, and is somewhat troublesome to prepare; a hot room is also required in order to carry out the treatment. The benefit derived from the treatment seems to be largely due to the profuse diaphoresis as well as the large quantities of fluid swallowed; between them these two factors cause a greatly increased metabolism, while the small quantity of mercury contained in the preparation probably exerts a curative action at the same time.

MERCURIAL POISONING

In the event of a patient showing signs of mercurial poisoning the administration should of course be stopped at once. Natural sulphur water, sulphides of the alkalies, or, if diarrhoea is not excessive, alkaline sulphates should be given internally, in addition to which the patient should have a hot-air bath at a temperature of 180° F. for ten to twenty minutes daily.

DIET

Syphilis is a wasting disease, hence the general idea in dieting the patient should be not to stint his food. The ' Ordinary ' diet of military hospitals is quite sufficient for the average case. Malignant cases require extras, and Colonel Lambkin strongly recommends sanatogen for these patients. Alcohol is better withheld, but if the man has a very great desire for it a small bottle of stout with his dinner does no harm. Ward insists on the value of large draughts of hot water.²¹ Fresh air is of the greatest importance, and patients in hospital with syphilis should be turned out into the grounds whenever this is feasible, instead of lying on their beds in the wards.

Smoking is one of the great troubles when treating soldiers for syphilis. It is next to impossible to persuade a soldier who is out of hospital to give up the use of tobacco, or even to moderate the number of cigarettes consumed. Excessive smoking, coupled with neglect of the tooth-brush, is responsible for nearly all the mucous patches met with.

CHAPTER XXIII

MANAGEMENT OF A CASE

IN the preceding chapter the individual plans of treatment were discussed from a military point of view generally. A soldier who contracts syphilis is in most cases treated at first in hospital, but subsequently and indeed mainly as an out-patient. The management and treatment of soldiers will therefore be briefly recapitulated under the headings, A. In hospital, B. Out of hospital. The majority of the patients are admitted for the first time with a venereal sore which may or may not harbour the virus of syphilis, hence a short reference to the treatment of venereal sores seems appropriate.

Cases requiring treatment in hospital may be grouped as follows :—

A. IN HOSPITAL

1. The venereal sore.
2. The syphilitic chancre.
3. Early secondary syphilis.
4. Relapses in the secondary stage.
5. Relapses in the tertiary stage.
6. Cases of suspected tertiary syphilis.

1. TREATMENT OF THE VENEREAL SORE

When the patient is first admitted it is generally impossible to say whether we are dealing with a soft chancre or the primary lesion of syphilis ; it is wiser therefore not to use any preparation of mercury which, if syphilis is present, might retard (without preventing) further developments.

The commonest form of sore is a shallow ulcer with a yellow base composed of pus cells, dead epithelium, and dried exudation. As long as this layer covers the surface medicaments do not come in contact with the germs which have produced the lesion, and

consequently exercise little if any influence on the sore.* The most effective way of removing this protective covering is to apply a dilute solution of peroxide of hydrogen (one part of peroxide with three parts of water) by means of a throat spray with a fine nozzle; if forcibly driven on to the surface of the ulcer the solution penetrates the covering layer, and liberates free oxygen in its substance, which is detached as a frothy scum. The sore should then be bathed with any non-irritating lotion,—boric lotion does well,—and a stimulating antiseptic painted on. For this purpose I prefer tincture of iodine; other useful preparations are a 1 per cent. watery solution of picric acid, a 2 per cent. solution of formalin in water and glycerine, a 2 per cent. solution of nitrate of silver. Turpentine, compound tincture of benzoin, and many other substances can be used, but great care must be taken to prevent these from running over the surrounding surface. After the above application a non-irritating wet dressing, e.g. boric lint, should be applied and changed every two hours during the day. Powders are not to be recommended for this kind of sore, as they combine with the discharge to form a scab under which the ulcer has a great tendency to spread. Medicaments in the form of ointments are largely neutralized by their greasy base, but, owing to their lubricating action on the opposed surfaces, are useful when healing has begun.

Sores situated in the sulcus behind the fraenum nearly always perforate its base; to facilitate the escape of discharge a filament of gauze dipped in some antiseptic solution should be threaded through the perforation. When perforation has occurred the sore rarely heals until the fraenum has become completely severed; time will in most cases be saved by dividing the fraenum with the actual cautery as soon as perforation has taken place.

Phagedaenic chancres are fortunately not very common, but require vigorous treatment to prevent the destruction of important tissues. The sores are almost always situated under a tight and inflamed foreskin, and are thus hidden from view: sometimes this inflammation will subside when the inner surface of the prepuce is thoroughly syringed out every hour; if, however,

* In all sores, where possible, a routine examination for the spirochaete should be made by dark-ground illumination; see pp. 140-46 of this volume.

the swelling does not diminish sufficiently to allow the chancre to be brought into view within twenty-four hours the foreskin must be slit up and the sore completely exposed. The application of escharotics, e.g. pure nitric acid, has been recommended, but in my opinion there is considerable risk of damaging the tissues which are not already infected and so leading to a rapid extension of the process; moreover the application is always very painful and frequently fails to check the lesion. A spray of peroxide of hydrogen thoroughly applied to the whole surface does no harm, and often exerts a most beneficial effect; following this, a large dressing of one part of iodoform and three of finely powdered charcoal covered with a boric fomentation should be applied.

The powder should be reapplied and the fomentations changed every two hours; the spray is to be used night and morning. If these measures fail the continuous hot bath should be tried; this is always troublesome as the water cools so quickly. An improvised apparatus may be made use of by propping a hip-bath on bricks and placing a spirit-lamp underneath, the water being partially changed every four hours. In very severe cases, if everything has failed, a general anaesthetic must be given and the chancre destroyed with the actual cautery; this is a severe operation and should be reserved to the last.

2. SYPHILITIC CHANCRE

Neisser¹ recommends that, if possible, the chancre which contains the primary focus of the disease, and from which all the other subsidiary foci are constantly being reinforced, should be excised. Unfortunately this is seldom practicable without mutilating the glans penis.

On the Continent a mercurial ointment is generally applied to the sore, while in Britain the favourite dressing is black wash.* Since Metchnikoff has shown what a powerful effect a 33 per cent. calomel ointment has on freshly inoculated syphilis, this or a similar preparation might with advantage be used for a chancre.

Hallopeau injects atoxyl into the chancre or the nearest

* It is well to note that if an examination for the spirochaete is to be made it must be done before mercury in any form whatever is applied to the sore or given internally.

lymphatic glands ; Neisser recommends injections of calomel into the tissues between the sore and the nearest lymphatic glands.

In view of the reported successful treatment of certain skin diseases by ions of zinc carried in by the galvanic current, I tried the plan of introducing ions of mercury into the chancre of syphilis. In two cases the Hunterian chancre became soft and much diminished in size after six applications of the negative pole, the pad being moistened with a 1 per cent. solution of perchloride of mercury. The general course of the disease was not appreciably influenced by this treatment.

French recommends the use of X-rays to promote healing in chancres.²²

3. EARLY SECONDARY SYPHILIS

We now have to consider the general treatment of a soldier diagnosed as syphilitic while still in hospital. In selecting any particular plan of treatment the points to be borne in mind are : (1) The sooner the man can be returned to duty the better. (2) The disease must first be brought under control, so that there shall be no risk of the man spreading it to his comrades in barracks, or to any loose woman he may consort with. (3) The less time taken up in administering the treatment the better, as the medical officer probably has other duties to attend to.

Treatment by Mercury

(a) *By the mouth.* The great attractions of this plan, viz. ease of administration and absence of pain, are more than counterbalanced by the length of time required to produce a definite antisymphilitic effect. Even if energetically pushed a month or probably longer is necessary before we can safely dismiss the man to duty. In a severe case of syphilis occurring in a tropical country the chances are that, long before we have brought the disease under control, severe gastro-intestinal disturbance will ensue, and necessitate the cessation of this form of treatment. It can only be recommended for mild cases at home when other forms of mercury cannot be administered.

(b) *Inunctions.* This is an excellent method of treating syphilis and one which is deservedly popular with well-to-do patients at continental Spas. The process is painless, the daily bath helps to pass away time, and the professional rubber while

carrying out the inunction retails the local gossip for the amusement of the patient. In a military hospital, however, the conditions are somewhat different, the primary object being to return the man to duty as soon as possible. Natural hot waters not being available hot baths have to be substituted ; the number of baths in a military hospital is not usually sufficient to allow of more than one man at a time from each ward having a hot bath, so that the bathing process would have to be extended over a large part of the day ; again, the cost of providing fuel for heating large quantities of water means a considerable expense to the State. It is not likely that trained rubbers will ever be provided on account of the expense, while if the patients are employed to rub each other (which they can very well do) they must be kept under supervision during the process. This means that the medical officer, ward-master, or a reliable orderly, must devote nearly an hour of his time to see that each batch of men wash and rub themselves properly ; so that unless the patients can be gathered together to perform their inunction at the same time an extra attendant would have to be provided for the sole purpose of supervising inunctions. Bathing is not absolutely essential, and can be replaced to a certain extent by washing the hands and the part of the skin about to be rubbed ; the stimulating effect of the hot bath on the body metabolism is, however, regarded as of considerable importance in this form of treatment.

The underclothing too must become badly soiled with the ointment ; older clothing may be reserved for these patients, but this again leads to a certain amount of trouble in the linen stores, and in practice means the provision of additional clothing, as the soiled sets cannot be used by patients other than those undergoing inunction.

The greatest drawback from a military point of view is that, if systematically carried out, the first course should consist of forty-two daily rubbings, which means a minimum stay in hospital after syphilis has been diagnosed of at least six weeks ; or about twice as long as when injections are employed.

We may therefore conclude by saying that if the surgeon has any special fancy for this form of treatment and has the time and energy to see that it is properly carried out, the results will

certainly be satisfactory. At a large station, however, where many patients are under treatment at the same time, equally good results may be obtained by other means with much less trouble and expense, and in a shorter time.

Intramuscular injections. This method of administering mercury presents many advantages and few disadvantages in the routine treatment of syphilis in a military hospital. Its attractions may be briefly enumerated as follows :—

(i) The administration of the drug is entirely in the hands of the surgeon, who measures and introduces the dose himself, and is not dependent on the zeal of orderlies or others, in ensuring that the correct dose is properly administered; he can also accurately vary the dose to any extent he may consider necessary.

(ii) The drug introduced into the tissues is rapidly absorbed into the circulation and reaches every part of the body.

(iii) A small bulk of cream suffices for many injections, and there is no waste, such as occurs in inunctions, where a variable quantity of the dose is left on the skin and underclothing till washed away.

(iv) Sufficient mercury can be introduced at a single injection to maintain a vigorous antisyphilitic effect for a long time, thus permitting the medical officer to attend to any other duties he may have, knowing that his treatment is being automatically continued.

(v) When assisted by competent orderlies a single medical officer can treat a large number of men in a short time.

(vi) It does not produce any gastro-intestinal disturbance.

The disadvantages are two, viz. :—

(i) The medical officer must himself give each injection, and cannot delegate this operation to a subordinate; this does not really constitute a valid objection to the treatment, as no medical officer having sufficient time to spare would object to performing this duty.

(ii) Dangers of the treatment. Provided the surgeon has observed the precautions recommended before beginning the administration of mercury the risks are exceedingly remote; it must be remembered that mercurial poisoning may follow the administration of mercury in any form, and is not confined to the injection method.

Choice of preparation. In the routine treatment of early secondary syphilis the soluble salts are not to be recommended, on account of the small quantity of mercury which is introduced at each injection, necessitating a large number of injections at frequent intervals; again, as each injection is more or less painful, the patient speedily becomes disgusted with the treatment and refuses to submit to it after a short experience. In the absence of cream or insoluble salts the soluble salts may be employed as a temporary substitute.

For the ordinary case there is no preparation to equal mercurial cream; a single dose contains more mercury than can be safely given in any other form, the injection is practically painless, the therapeutic effect is rapidly developed and is maintained for a longer time than after any other preparation. The treatment is popular among soldiers, who only very rarely object to it. Of the insoluble salts calomel is the only one worth considering. The injection is, however, almost always painful, even when using Colonel Lambkin's calomel cream; a smaller quantity of mercury is introduced, but its therapeutic effect is more rapidly developed than that of any other substance employed for intramuscular injections. This salt should therefore be reserved for special cases which we wish to bring under the influence of mercury as quickly as possible.

Of the other 'occasional' methods of giving mercury the only ones which might be of use in early secondary syphilis are Welander's bag (vol. ii, p. 208) or Audry's suppositories (vol. ii, p. 219). In the uncommon event of early syphilis developing concurrently with some serious illness, e. g. severe enteric fever, by employing one of the above plans we can carry out a mild mercurial treatment without interfering with the patient's general comfort or any other treatment he may be undergoing.

4. RELAPSES IN THE SECONDARY STAGE

The next group of cases requiring treatment in hospital consists of relapses in the secondary stage. Most of these cases are readmitted for lesions of the mucous membrane of the throat and mouth, partly due to excessive smoking and partly to neglect of the teeth; sometimes a case of syphilitic iritis occurs in a man who has successfully evaded treatment during the early stage

of the disease. In these cases a certain amount of mercury has already been given, and our object is not so much to introduce a large quantity of mercury as to obtain its therapeutic effect. In all these cases calomel injections are indicated. These rapidly cause the disappearance of the symptoms, after which we can proceed with any other form of treatment, preferably mercurial cream injections. I have tried soamin, giving 7 grains every second day till a total of 70 grains had been injected, but have not found that the results are nearly so good as when calomel injections are used.

The local treatment of mucous patches may be broadly stated to be : (1) Insist on cleansing the teeth, and the use of a mouth-wash after each meal. (2) Stop all irritation, e.g. remove sharp teeth and stop smoking. (3) Use a local antiseptic, e.g. tincture of iodine, picric acid in 1 per cent. solution, chromic acid 10 per cent., followed by silver nitrate 25 per cent. solution.

5. RELAPSES IN THE TERTIARY STAGE

In the British army of to-day it is rather unusual to meet with tertiary syphilis. Occasionally old soldiers who acquired the disease before the present system of treating syphilis was introduced, are admitted to hospital with tertiary lesions, e.g. nodes on the skull or long bones, gummatous ulcers of the skin, or destructive lesions of the naso-pharynx. In almost every case the treatment of the original infection has been of the slightest and mercury in some form is indicated. This class of patient must, however, possess a very considerable degree of resistance to the virus of syphilis, as usually some years have elapsed since the original attack, and the man has continued to perform his duty. Hence for these patients we want an active form of mercurial treatment with the introduction of a large quantity of the drug. A course of calomel injections, half a grain a week for four weeks, together with full doses of the iodides, will generally effect a wonderful improvement in the man's condition ; he can then be discharged to out-patient treatment. In the case of old soldiers, who have contracted malaria as well as syphilis, and have become debilitated in consequence of service in the tropics, a course of soamin injections acts like a charm, improving the general health,

especially increasing the body-weight and causing rapid healing of any syphilitic lesion. In the graver lesions of tertiary syphilis, e. g. affections of the central nervous system, a course of iodipin injections is much more effective than the iodides of the alkalies prescribed in mixtures ; 2 drachms of the 25 per cent. solution injected subcutaneously every second day for two or three weeks will often produce a wonderful improvement.

Very exceptionally a patient is admitted who has had a very extensive mercurial treatment, generally begun some months after the date of the original infection, and who presents persistent lesions of the skin or mucous membranes. Further mercurial injections do no good, and may cause positive harm. In two such cases a course of soamin injections produced a very great improvement and eventual healing.

For debilitated men invalided from the tropics and having gummatous ulcers of the skin a course of Zittmann's treatment (vol. ii, p. 248) is of great benefit, especially if the soldier has been in the habit of indulging too freely in alcoholic beverages.

6. CASES OF SUSPECTED TERTIARY SYPHILIS

In cases in which the lesion is merely suspected of being syphilitic, and it is desired to ascertain whether this is the true cause or not, injections of the soluble salts are indicated, say $\frac{1}{5}$ of a grain of perchloride of mercury thrice weekly for two weeks, together with full doses of the iodides. If the trouble is of syphilitic origin this treatment should produce a decided improvement, in which case the surgeon can proceed with any form of treatment he prefers ; if, on the other hand, there is little or no improvement, it is fairly safe to exclude syphilis, and no great harm can result from the experiment as the total quantity of mercury ($\frac{6}{5}$ grains of perchloride) introduced is too small to produce any deleterious effect on the patient.

For the so-called parasymphilitic lesions, e. g. locomotor ataxy, mercurial treatment in any form is of very little, if indeed of any benefit at all ; injections of iodipin if persevered with may effect some amelioration. In these cases it is quite possible that some improvement might follow a course of injections of soamin.

B. MANAGEMENT AND TREATMENT OUT OF HOSPITAL

Many men begin and finish their treatment as out-patients ; others receive a small portion of their treatment in hospital, but the greater number while attending as out-patients. It is therefore obvious that although the disease may be quiescent during this time, the out-patient treatment of syphilis in the army is really much more important than the treatment in hospital.

In selecting a plan of treatment for out-patients it must be borne in mind that the success of any plan depends largely on the regular attendance of the patients, and this again is largely dependent on the willing co-operation of officers commanding units. A commanding officer has to find a certain number of men each day for guards, fatigues, &c., and also to see that every man is instructed in musketry, field training, &c. If the men are asked to make frequent attendances at hospital for treatment, these must clash with important military duties, in which case the commanding officer is naturally inclined to think that military duties are of greater importance than medical treatment, and consequently not to assist the medical officer in enforcing regular attendance. When the medical officer only asks for a few attendances at fairly long intervals and the commanding officer finds that the men who attend regularly do not require to be admitted to hospital, and are available for duty in the intervals of attending for treatment, he very soon learns to appreciate the advantage to himself of supporting the medical officer's requests.

BRIEF COMPARISON OF PLANS FOR OUT-PATIENT TREATMENT

1. *By the mouth.* The out-patient treatment of syphilis can no doubt be efficiently carried out by means of pills or mixtures, if we could be certain that the medicine would be taken as ordered. In the later stages, if the men are intelligent and appreciate the gravity of the disease, as well as the necessity for treatment, the plan answers quite well. These are, however, exceptional cases. Most of the patients are young soldiers and somewhat thoughtless ; if given a supply of pills or mixture sufficient for a week or two, very few men will take the trouble to swallow the medicine when the visible signs of disease have once disappeared. We may order the men to attend once or twice a day and receive their

medicine from a reliable orderly, but in this case it must frequently happen that hospital attendance coincides with some important duty ; one of the two must be missed, and failure to attend hospital can only be punished by the commanding officer who has ordered the parade or other duty.

Again, the quantity of mercury which can be administered by the mouth without producing undesirable disturbances of the digestive tract is small, hence the effect of pill or mixture treatment is transient, and consequently treatment must be carried out daily for a relatively large number of days consecutively, after which only a short interval can be allowed ; this means that out of the usual two years' treatment for syphilis the man would have to receive treatment on at least 500 days out of the total 730 days. Compared with any other plan of treatment it will be seen what a great amount of trouble this plan means both for the patient and his medical officer. In tropical stations it is extremely doubtful if the average man can tolerate sufficient mercury, taken internally, to cure syphilis. This plan of treatment does not present any advantages for the routine treatment of out-patients in the army.

Inunctions. Surgeon-Major Rayner ²⁵ has successfully carried out the inunction treatment of out-patients among the men of his corps ; it must, however, be remembered that he was the permanent medical officer of a small and very select regiment, and that he therefore worked under exceptionally favourable conditions which the ordinary army medical officer is not likely to have. To attempt the routine treatment of soldiers doing duty in the ordinary garrison consisting of several units, the men of which have contracted syphilis at different times, and are therefore at all stages of the disease, would mean that the medical officer must establish an inunction clinic daily in the afternoon for at least six days in the week ; either the medical officer himself or his ward-master would have to be present during this time in order to supervise the treatment. Considerable difficulty would be experienced, too, in getting the men to attend for the thirty to forty consecutive days necessary to complete a course of inunctions.

Each man would have to provide himself with two complete

sets of underclothing, one being worn night and day for a week while the other is at the wash ; the clothing would be considerably damaged, if not entirely ruined by the ointment. There is the further theoretical objection that a man who has rubbed some 20 grains of metallic mercury into his skin should not be allowed to sleep in a barrack room with men who are not undergoing mercurial treatment, as the quantity of mercury volatilized is quite appreciable. Inunction treatment can only with difficulty be carried out for soldiers who are doing their duty, and the advantages of the plan are not such as to justify the amount of trouble necessary to carry it out.

Intramuscular injections. For the out-patient treatment of syphilis in the army intramuscular injection of mercurial cream is the ideal method. At most only one attendance a week is necessary and that only during the first course, after which one attendance in each fortnight or month is in nearly every case sufficient for thorough treatment. No other plan of treatment leaves the soldier so free to attend to the duties for which he is enlisted and paid, while its value from a therapeutic point of view has been amply demonstrated by the small number of men who require readmission to hospital during their whole course of treatment. The medical officer's work, too, is simplified, as by devoting an hour or two once a week to the out-patients on the syphilis register he can watch the progress of and administer the treatment to a large number of men. The soldier, too, appreciates the value of the treatment, and only in very exceptional cases does a man make any objection to it—many, on the other hand, ask for injections.

Injections of the soluble salts are not so satisfactory, as, apart from the accompanying pain of each injection, the quantity of mercury introduced is small, and the injections have to be frequently repeated ; this neutralizes one of the great advantages of intramuscular injections. Calomel is more painful than mercurial cream, and a smaller dose of mercury is given at each injection ; it is, however, more active than mercury ; hence its use is indicated when we wish to get a rapid but not so lasting effect, especially in men showing fresh manifestations of the disease in the intervals between the courses of mercurial cream. Occasionally in the more

severe cases of syphilis a few injections of calomel at the onset of the disease produce a rapid amelioration in the patient's condition, when treatment by injections of mercurial cream may be substituted.

Arylarsonates. One great drawback to the use of these salts for out-patients is the necessity for three attendances a week. I have tried a course of soamin injections in a few men showing fresh manifestations during the early secondary stage, but have been somewhat disappointed with the results, which appear to me to be much inferior to injections of calomel. In old soldiers soamin has produced a great improvement, not only in the particular lesion of syphilis but also in the general health.

FITNESS FOR SERVICE WHILE UNDER TREATMENT FOR SYPHILIS

1. *General duty at home.* As soon as the original sore has healed, provided the man has no lesion of the mucous membranes or other tissues which might possibly be a source of infection to any other man in the barrack room, the soldier under treatment for syphilis is perfectly well able to perform all his duties at home, merely being excused from duty when this happens to clash with his treatment. As a general rule a soldier is much happier and healthier when employed at his ordinary duty than when loafing in hospital; some men persist in smoking to excess or indulging too freely in alcoholic beverages, and to prevent this it may be necessary to readmit these men for a short time.

2. *Service abroad.* For temperate climates the same conditions as at home are applicable. For tropical climates the disease must have shown itself amenable to treatment. Patients who have had several fresh manifestations during their treatment should not be sent to tropical climates, as if we are unable to cure the disease in Great Britain, it is quite certain that we cannot do so under the debilitating influences of a tropical climate. Syphilis contracted in the tropics will in most cases yield to careful treatment, permitting the man to continue at duty; if not, a change to a hill station must be tried, and if this fails to benefit him he must be invalided home.

3. *Active service.* Before being sent on active service the

man should have completed one year's treatment, and have shown no fresh manifestation of the disease since being placed on the syphilis record. For service in very trying climates like that of West Africa it would not be wise to take any man unless he had completed his whole course of treatment and could reasonably be regarded as cured.

CONCLUSION

The present system of treating syphilis in the British army has added a good deal to the work and worry of the army medical officer. That the plan has been generally successful and of great benefit to the army is proved by the diminution in the number of admissions, of men constantly sick in hospital, and of men invalided home and out of the service on account of syphilis, since the present system has been adopted. (See pages 29-44.)

REGULATIONS AFFECTING THE SYPHILITIC SOLDIER

Under the provisions of Par. 462, King's Regulations for the Army, a soldier who contracts venereal disease is ordered to report sick without delay; it is further directed that this order shall be specially brought to the notice of recruits and shall be read out on parade at least once a quarter. Failure to comply with this regulation, if detected, entails a liability to severe punishment.

Every man suffering from a venereal sore is admitted to hospital; this course is necessary in order to prevent the man from communicating the disease to his comrades in the barrack room. While in hospital for venereal disease the soldier forfeits his service pay as ordered in Appendix V, Par. 13 of the Royal Warrant for Pay, &c. That a soldier who has become inefficient by reason of having acquired venereal disease should suffer some loss of pay seems at first sight a very reasonable argument; the practical effect of the order, however, is to induce a man not to report sick, but, taking his chance of being detected, to obtain treatment from some one other than the regular army medical officer, hoping thereby to save his pay. A not uncommon result of this delay is that the soldier finds himself obliged to report sick and go to hospital when his disease has assumed a very much

aggravated form ; e. g. when he is covered with a copious papular syphilide. The experiment of stopping all pay for soldiers in hospital with venereal disease was tried from 1870 to 1873, but was then abandoned. Under the above pay regulation, service pay can be restored to the man on his return to ordinary duty, 'if his commanding officer is satisfied that the man has regained his physical efficiency.' Thus each commanding officer can set up his own standard of efficiency, and this, in a mixed garrison, often leads to discontent, which would not be the case if the service pay were restored to each man on his return to ordinary duty.

When the sore has healed, if no further signs of disease have appeared the man is discharged to duty. At the same time the medical officer who discharges him makes out Army Form I 1239 in duplicate ; this form, in addition to the man's name and other particulars, gives the date on which the sore was contracted and the date of his discharge from hospital. One copy goes to the man's commanding officer for his information and the other to the medical officer under whose charge the man is. This medical officer arranges for the man to appear at certain dates for inspection till he is satisfied that no signs of syphilis are likely to develop. He then diagnoses the case as 'Soft Chancre' on Army Form I 1239, and returns it to the hospital in which the man was treated in order to allow the records to be completed.

Some trouble is naturally experienced in following up men who contract a venereal sore near the end of the year, and leave this country for a foreign station before a diagnosis is made.

Should the diagnosis be 'syphilis', it is entered on Army Form I 1239 and this is returned to the original hospital. At the same time the medical officer places the man's name on the syphilis record, makes out a syphilis case sheet, and makes an entry in the man's medical history sheet of the date on which the man was placed on the syphilis record.

Syphilis record. (This until recently was known as the *Syphilis Register*.) In this record all names of men who contract syphilis are entered, together with certain particulars as to treatment, &c. Names put on for the first time receive a serial number in black ink, those arriving from other stations while

under treatment are noted in red ink (without a number) as transfers. By means of this register a record is available at any time of the number of men undergoing treatment for syphilis. When a man's name is struck off for any reason, as on transfer to another station, to the reserve, or on completion of treatment, the date is entered in a special column. When treatment has been completed the fact is noted on his medical history sheet. The medical history sheet contains notes of all his illnesses while in the army, so that the fact of his having suffered from syphilis is known to any medical officer who may subsequently have to treat him for any other complaint.

Syphilis sheet. This sheet deals only with syphilis. When first made out, the date on which the treatment is begun, together with the signs of the disease at that time, is entered. Each visit is entered on this sheet, together with the treatment received and any change in the man's condition. This sheet accompanies the man wherever he goes, so that any medical officer who has to treat him for syphilis has the whole history of the disease and its treatment at his disposal. When the man has completed his treatment the sheet is kept at his hospital for twelve months longer in case there should be any fresh manifestation of the disease. The sheet is then sent to the War Office for safe keeping. Before being removed from the syphilis record the man must have completed two years' treatment (including the intervals of non-treatment), and have been free from all manifestations of the disease for at least twelve months. Should the medical officer have any doubt as to the man being cured he can of course keep the man on treatment for any length of time he may consider necessary.

Full instructions as to the keeping of the record and syphilis case sheets are given in Appendix VII of the Army Medical Regulations.

CONTROL OF SOLDIER OUT-PATIENTS

In large stations where many men belonging to different corps are undergoing treatment some kind of system has to be adopted. The following one has been found satisfactory in

Malta ; in addition to the medical officer a clerk and an intelligent orderly are required. One day in the week, not likely to clash with important parades, is selected ; three days before this the clerk makes out a list of men due to attend and sends it to each unit. When the men arrive the orderly weighs them and the clerk enters the result in the attendance book ; similarly the urine is examined and the result noted in the attendance book.

When all have been weighed the medical officer is informed and begins the examination of the men. A space in front of one of the windows is screened off from the rest of the room. As the clerk calls out each man's name he steps up to this space and the clerk hands the man's syphilis case sheet to the medical officer, who, after examining the man, dictates to the clerk any remarks about the man's condition, the treatment, if any, for the day, and the date on which the man is next to attend. The clerk enters these notes in the attendance book, which is merely a rough notebook. When all the men have been seen they are sorted out into groups according to the treatment to be received. The orderly, who has previously placed all the necessary apparatus ready, then proceeds to sterilize the skin of each man immediately before the medical officer gives the injection ; the clerk ticks off the names as the treatment is administered. The clerk then copies his rough notes into the men's syphilis sheets and enters the names on the pages of the attendance book bearing the date on which the men are next due for treatment.

When it is desired to give iodide of potassium to a man he is directed to attend at his medical inspection room once or twice daily ; a hectographed slip is filled in with the required data, and this is sent to the medical officer in charge of the inspection room.

Note to 'Routine of Treatment'.

Since the above was written the treatment of venereal diseases in the army has been investigated and reported on by a War Office committee. The principal recommendations made by the committee for the guidance of junior officers may be briefly summarized as follows :—

In order to systematize the routine of treatment, a definite procedure is laid down. On admission, a patient suffering from syphilis is to be given an 'Advice Card', which gives some explanation as to the nature of the disease, and the necessity for prolonged treatment. He is to use a mouth-wash frequently, not to smoke, and must have a tooth-brush and powder. His urine is to be examined, body-weight recorded, and he is told which bath and latrine to use.

A routine for medical officers is also recommended—some special duty, e.g. the examination of syphilis case sheets, being assigned to each day of the week, in addition to the daily work.

Instructions are also given as to the procedure to be followed when administering injections of mercury or employing inunctions.

The report then draws up a scheme for dealing systematically with out-patients when they attend for treatment.

The committee also publishes a plan of treatment by injection, using a dose of one grain of metallic mercury, in four courses extending over $23\frac{1}{2}$ months, with a total of 27 injections. It is, however, distinctly stated that this plan is only intended as a guide.

The committee does not consider that arylarsonates act as a prophylactic against syphilis, and does not recommend their use for this purpose, but thinks that in certain cases they may be used as a substitute for mercury.

Reports. The committee recommend certain modifications in the syphilis case sheet, mainly in the direction of giving more space for details, and of ensuring, by means of printed headings, that all important particulars shall be correctly entered. A syphilis 'Record Book' is substituted for the 'Syphilis Register'. The 'Record Book' will contain a short clinical history of the case, together with notes on progress; these will be entered up at the station where the man is first diagnosed.

Any unusual occurrences, e.g. abscess, mercurial poisoning, recurrences after the completion of treatment, are to be reported to the Lecturer on Syphilology at Rochester Row.

APPENDIX I

FORMULAE

THE commoner preparations given by the mouth are:—

PILLS

Hydrarg. cum cretâ, 1 to 2 grains, three to five times daily.

Pil. hydrarg., 1 to 2 grains, two to three times daily.

Salicylate of mercury, $\frac{1}{4}$ to $\frac{1}{2}$ of a grain, three times daily.

Tannate of mercury, $\frac{1}{2}$ to 1 grain, three to five times a day.

Green iodide of mercury, $\frac{1}{6}$ to $\frac{1}{3}$ of a grain, three to five times a day.

Perchloride of mercury is commonly ordered as a mixture, from $\frac{1}{2}$ to $1\frac{1}{2}$ drachms of the liquor hydrarg. perchlor. (B.P.) being prescribed, with some vegetable infusion. Iodide of potassium, 5 to 20 grains, may be added to each ounce, thus forming the biniodide of mercury which is a most useful remedy in late syphilis.

FRESH INFUSION OF SARSAPARILLA

The following formula has been found to be satisfactory in Malta: A two-pint infusion pot is filled with dry root, tightly pressed down, and boiling water poured on till the jar is quite full; it is then allowed to stand for twelve hours, after which the fluid is drained off and filtered. To preserve the filtrate 1 drachm of syrup and 15 minims of absolute alcohol are added to each ounce. Dose 1 to 2 ounces, three to four times a day. The infusion can also be used as the vehicle for iodide of potassium.

INUNCTION

Mercurial ointment (B.P.) 40 grains.

Lanoline 40 „

Mix thoroughly and wrap in wax paper.

At Rochester Row Military Hospital the following formula is employed:—

Mercurial ointment 25 grains.

Lanoline $12\frac{1}{2}$ „

Adeps benzoatus $12\frac{1}{2}$ „

This would only contain $12\frac{1}{2}$ grains of metallic mercury—a somewhat low dose.

INTRAMUSCULAR INJECTIONS

*Mercurial creams*²⁶ :—

Form 'O' :—

Mercury, ʒj by weight.

Lanoline, ʒiv by weight.

Paraffin liq. carbol., 2 per cent. to ʒx fluid.

10 minims of cream contain 1 grain of mercury.

This cream is largely used in the army, but in my opinion the percentage of mercury is unnecessarily low, a large injection being required in order to introduce a dose of 1½ grains of mercury.

Form 'A' :—

Mercury, 2 parts by weight.

Lanoline, 3 parts by weight.

Paraffin liq. to 10 parts (by volume).

1 grain of mercury in 5 minims.

This is a convenient strength : the cream is stable up to nearly 80° F.

*Colonel Lambkin's creams*²⁷ :—

1. *Mercurial cream.*

Hydrarg. pur. 10 grammes.

Creo-Camph 20 c.c.

Palmitin basis ad 100 c.c.

Melting point 37° C.

10 minims contain 1 grain of mercury.

This cream is favourably reported on by Colonel Lambkin and his colleagues at the Rochester Row Hospital.

2. *Calomel cream.*

Calomel 5 grammes.

Creo-Camph 20 c.c.

Palmitin basis to 100 c.c.

10 minims contain ½ grain of calomel. Melting point 37° C.

This is an excellent cream, easily manipulated, and, as Colonel Lambkin claims, very much less painful than any calomel injection hitherto introduced.

Zittmann's Treatment

The following formula gives sufficient for the treatment of one patient for about a week :—

Bruised sarsaparilla root, 4 ounces, is digested for twenty-four hours in 280 ounces of water.

To this the contents of No. 1 package are added, and the mixture boiled, while the contents of No. 2 package, placed in a linen bag, are suspended in the vessel.

No. 1 package :—

Fennel seed, anise seed, of each 80 grains.

Cut up liquorice root and senna leaves, of each 240 grains.

No. 2 package :—

Powdered alum and white sugar, of each 120 grains.

Calomel 80 grains, cinnabar 20 grains.

The mixture is kept just boiling till its bulk is reduced to a gallon. It is then strained through a fine cloth, and put up in bottles holding about a pint. These are labelled 'Zittmann's Decoction No. 1 (Strong Decoction)'.

No. 3 package :—

Cardamom seeds, cinnamon bark, and liquorice root, of each 60 grains.

The contents of No. 3 package are then added to the residue, together with 280 ounces of water, and the whole is simmered down to a gallon. This is strained and bottled as before, and finally labelled 'No. 2 (Weak Decoction)'.

Pills. R Hydrarg. subchlor. . 2 grains.

Extract. colocynth. . 2 „

Extract. hyoscyam. virid. 2 „ to make two pills.

The room must be kept at a temperature of 80° F.

The diet is not to contain sugar or spices.

The evening before the treatment is begun two pills are given. Next morning the patient has a light breakfast at 7 a.m.

During the first four days the patient drinks half a pint of the strong decoction, very hot, at 9, 10, 11, and 12 noon. The quantity may have to be reduced as the mixture is very nauseating. The patient is kept in bed in order to promote diaphoresis.

At 12.30 a light luncheon is given, and at 3, 4, 5, and 6 p.m., he is made to take a half-pint of the weak decoction cold. The patient is allowed up in the evening.

About 6 p.m. a good dinner is allowed but no green vegetables.

This routine is continued up to the fifth day, when the patient is allowed to get up and have a bath. On the same evening he has two more pills, and the next day the decoction as before, up to the fifteenth day. This finishes the treatment.

LOCAL APPLICATIONS FOR VENEREAL SORES

Wet dressings :—

1. Tincture of iodine, min. v ; picric acid $4\frac{1}{2}$ grains to an ounce of water.

2. Formalin 30 minims, glycerine 60 minims, water to 1 ounce.

3. Pure carbolic acid.

The above preparations should be painted on with a camel-hair brush, and a dressing of wet boric lint applied immediately after.

For syphilitic chancres :—

1. Black wash.

2. Calomel 33 parts ; vaseline and lanoline, of each equal parts to make 100.

3. Mercurial ointment.

APPENDIX II

SCHEMES OF TREATMENT

The following schemes of treatment have been drawn up as likely to meet the requirements of the average case of syphilis. The disease may, however, vary greatly in its severity and general course in different patients ; the surgeon must therefore be prepared to vary his scheme of treatment accordingly, in order to meet the needs of any particular case. Again, as different medical officers may prefer different plans of treatment, a rough scale of equivalents is given to facilitate the estimation of the value of any previous treatment.

Scale of Approximate Equivalents

1. One injection of mercurial cream containing $1\frac{1}{2}$ grains (= 10 cg.) of metallic mercury is equivalent to—

2. Five injections of a soluble salt (say, perchloride of mercury containing $\frac{1}{5}$ grain in each injection) ; or to—

3. Seven inunctions of mercurial ointment (using 20 grains of metallic mercury daily) ; or to—

4. Twenty-one pills, each containing 2 grains of hydrarg. cum cretâ, three pills taken daily.

The above scale of equivalents represents energetic treatment for one week.

Soamin. It is not easy as yet to state what the value of soamin injections are. Probably a course of ten injections, one every second day, totalling 100 grains of soamin, if given at the beginning of treatment, may be taken as equivalent to six mercurial cream injections, i.e. six weeks' energetic treatment.

I. SCHEME OF TREATMENT BY PILLS; EACH CONTAINS ONE GRAIN OF HYDRARG. CUM CRETÂ

<i>First Course—</i>	<i>Months.</i>	<i>Pills.</i>
One month taking 6 pills a day	1	180
Interval of 7 days	—	—
One month taking 4 pills a day	2	120
Interval of 7 days	—	—
One month taking 3 pills a day	3	90
Interval of 14 days	—	—
		<hr/>
		completes 4 months
<i>Second Course—</i>		
Three months taking 3 pills a day, omitting these on the last 7 days of each month	3	207
Interval of one month	1	—
		<hr/>
		4 months
<i>Third Course—</i>		
Three months taking 3 pills a day, omitting these on the last 7 days of each month	3	207
Interval of one month	1	—
		<hr/>
		4 months
<i>Fourth Course—</i>		
Twelve months, taking 2 pills a day for the first 15 days of each month	12	360
		<hr/>
Total		24
		<hr/>
		1,164
		<hr/>

If the patient has shown any fresh manifestation during the last twelve months a further six months' similar course should be added, or better, the pill should be replaced by a mixture containing 1 drachm of liquor hydrarg. perchlor. and 10 grains of iodide of potassium. The same mixture may with advantage be substituted for the pill during the second, fifth, and ninth months of treatment, or iodide of potassium may be given in addition to the pill. Patients taking pills must be seen at least once a week, particular attention being paid to the mucous membrane of the mouth and tongue.

II. SCHEME OF TREATMENT BY INUNCTION, USING TWENTY GRAINS OF METALLIC MERCURY DAILY

<i>First Course—</i>	<i>Months.</i>	<i>Grains of Hg.</i>
42 daily inunctions	1½	840
Interval, 3 months, taking potassium iodide 20 grs. daily for the first 15 days	3	—
<i>Second Course—</i>		
42 daily inunctions	1½	840
Interval, 3 months, taking iodide of potassium as in first course	3	—
<i>Third Course—</i>		
30 daily inunctions	1	600
Interval, 6 months	6	—
<i>Fourth Course—</i>		
30 daily inunctions	1	600
Interval, 6 months	6	—
<i>Fifth Course—</i>		
20 daily inunctions	$\frac{2}{3}$	400
	<u>$23\frac{2}{3}$</u>	<u>3,280</u>

Owing to the difficulty of carrying out inunction treatment with out-patients, it is advisable to change to one of the other plans of treatment after the first course of inunctions.

III. SCHEMES OF TREATMENT BY INTRAMUSCULAR INJECTIONS

Plan A. Mercurial cream, each injection containing *one and a half* grains of metallic mercury.

<i>First Course—</i>	<i>Months.</i>	<i>Grains of Hg.</i>
6 injections, one each week	1½	9
Interval, 2 months	2	—
<i>Second Course—</i>		
4 injections, one each fortnight	2	6
Interval, 4 months	4	—
<i>Third Course—</i>		
4 injections, one each fortnight	2	6
Interval, 6 months	6	—
<i>Fourth Course—</i>		
4 injections, one each month	4	6
Total 18 injections	<u>$21\frac{1}{2}$</u>	<u>27</u>

This plan has been in general use for over four years in Malta, and in the average case of syphilis the results have been quite satisfactory. In the more severe cases, for the first three injec-

tions of the first course, $\frac{1}{2}$ to $\frac{3}{4}$ grain of calomel may be substituted for the $1\frac{1}{2}$ grains of metallic mercury. Should troublesome lesions of the mucous membranes appear a course of calomel injections should be given, $\frac{1}{2}$ grain being injected weekly for four weeks. This calomel course should be in addition to the above four courses of mercurial cream, an interval of one to two months being allowed before beginning the next course of cream injections. A mixture containing iodide of potassium, say 20 grains daily, may with advantage be prescribed during the first fortnight of the calomel cream course.

Plan B. Mercurial cream, each injection containing *one* grain of metallic mercury.

<i>First Course—</i>	<i>Months.</i>	<i>Grains of Hg.</i>
8 injections, one each week	2	8
Interval, 2 months	2	—
<i>Second Course—</i>		
6 injections, one each fortnight	3	6
Interval, 2 months	2	—
<i>Third Course—</i>		
6 injections, one each fortnight	3	6
Interval, 3 months	3	—
<i>Fourth Course—</i>		
4 injections, one each fortnight	2	4
Interval, 3 months	3	—
<i>Fifth Course—</i>		
4 injections, one each month	4	4
Total 28 injections	<u>24</u>	<u>28</u>

$\frac{1}{2}$ to $\frac{3}{4}$ grain of calomel may be injected instead of the 1 grain of metallic mercury for the first three injections of the first course. Where any fresh manifestation occurs the next two injections should be of calomel, $\frac{1}{2}$ grain in each ; iodide of potassium, 20 grains daily, should also be given for fourteen days, when calomel is prescribed.

Plan C. Soamin and mercury.

<i>First Course—</i>	<i>Months.</i>	<i>Soamin grs.</i>
10 injections, each containing 10 grains of soamin, given every second day. Interval, about 14 days	1	100
<i>Second Course—</i>		
4 injections, each containing $\frac{1}{2}$ grain of calomel, one a week	1	2 grs. calomel
Interval, 2 months	2	—

Third Course—

4 injections, one each month, containing $1\frac{1}{2}$ grains		
of metallic mercury	4	6 grs. Hg.
Interval, 4 months	4	—

Fourth Course—

4 injections, one each month, containing $1\frac{1}{2}$ grains		
of metallic mercury	4	6
Interval, 4 months	4	—

Fifth Course—

4 injections, one each month, each containing		
$1\frac{1}{2}$ grains of metallic mercury	4	6
26 injections	24	100 grs. soamin
		2 grs. calomel
		18 grs. Hg.

According to Neisser there should be a considerable advantage in using both soamin and mercury. The soamin course has been placed first owing to the greater number of injections required at short intervals. The soamin course is that recommended by Colonel Lambkin.

APPENDIX III

EXTRACTS FROM THE PROCEEDINGS OF A SPECIAL
WAR OFFICE COMMITTEE FOR THE PURPOSE OF
SYSTEMATIZING ROUTINE IN DEALING WITH
VENEREAL DISEASES

(III)—ROUTINE IN DEALING WITH CASES OF VENEREAL DISEASE

13. With a view to assisting junior officers and ensuring that small but important details in dealing with cases of venereal disease are not overlooked, the Committee has drawn up the following set of rules for guidance, applicable to each variety of venereal disease, under the headings : —

- (a) Routine on admission of a case of venereal disease.
- (b) Routine in syphilis and venereal sore wards.
- (c) Routine employed in administering injections of mercury.
- (d) Routine employed in using mercurial inunctions.
- (e) Routine in dealing with syphilis out-patients.
- (f) Routine in dealing with cases of gonorrhoea.

ROUTINE ON ADMISSION OF A CASE OF VENEREAL DISEASE
TO HOSPITAL

14.—(1) On the admission of a soldier suffering from venereal disease a short medical history of the case is entered in Army Book 181.

(2) The man is then admitted to the ward set apart for his particular disease and given an 'Advice Card' (Appendix 3).

(3) On being diagnosed syphilis, entries are made in Army Book 181, and a syphilis case sheet is made out.

ROUTINE IN SYPHILIS AND VENEREAL SORE WARDS

(a) *On Admission.*

15.—(1) Each man to be provided with an 'Advice Card'.

(2) Cases to use a mouth-wash frequently, especially those with mouth and gums affected, and to be warned not to smoke.

(3) Each man to have a tooth-brush and powder.

(4) The urine to be examined, and the result recorded.

(5) The ward orderly to see that the patient understands which bath and latrine to use.

(6) Body-weight in clothes to be recorded.

(b) *Weekly.*

16. Monday.—Examine all venereal sores, and look for signs of syphilis.

Tuesday.—Inspect tooth-brushes and powder, and examine throat, mouth, and teeth.

Wednesday.—Go through syphilis case sheets.

Thursday.—Injections of mercurial cream.

Friday.—Examine in the treatment room all venereal sore cases, and look for signs of syphilis.

Saturday.—Inspect tooth-brushes and powder, and examine throat, mouth, and teeth.

(c) *Daily.*

17. All venereal sores to be dressed in the treatment room under antiseptic precautions either by the medical officer or under his immediate supervision.

N.B.—All bedding and clothing to be changed twice a week, and prior to being handed over for washing to be immersed for two hours in carbolic lotion (1-60) contained in specially marked tubs.

ROUTINE EMPLOYED IN ADMINISTERING INJECTIONS OF MERCURY

18.—(1) A clean towel, wrung out of 1-20 carbolic lotion, is spread upon the table. The syringe, bottle containing cream, forceps, &c., are laid out upon it.

(2) Before use the syringe is sterilized by drawing boiling oil up into it.

(3) The needles not in use to be kept in the boiling oil ; a fresh needle being employed for each injection.

(4) A nominal roll of men to be injected to be given to the orderly in charge of the injection room, and each man to be called in turn.

(5) A second attendant prepares the man's buttock.

(6) The injection is made alternately into the upper third of each buttock.

N.B.—All intramuscular injections must be carried out by a medical officer.

ROUTINE EMPLOYED IN USING MERCURIAL INUNCTION

19.—(1) If practicable, it is advisable that a man should have a hot bath, and remain in it for twenty minutes before the inunction is commenced, otherwise the parts into which the ointment is to be rubbed must be thoroughly washed with soap and water.

(2) The rubbing should be done slowly, using firm pressure, for twenty minutes or until the part rubbed be neither shiny nor greasy, but has the appearance as if black lead had been rubbed on.

(3) Special underclothing (condemned sets) should be worn, and changed twice weekly.

(4) The following scheme for a week's course of inunction is recommended :—

Monday.—Calves of both legs.

Tuesday.—Both thighs.

Wednesday.—Back.

Thursday.—Chest.

Friday.—Both upper arms.

Saturday.—Both forearms.

Sunday.—Sides.

(5) The following ointment is used for each inunction :—

R Ung. hydrarg. grs. xxv.

Lanolin.

Adeps benzoat. aa. grs. xii, ft. ungt.

ROUTINE IN DEALING WITH SYPHILITIC OUT-PATIENTS

20.—(1) The men should be at the hospital 45 minutes before the arrival of the medical officer, during which time they are weighed and a list of weights taken.

(2) On the arrival of the medical officer, the men fall in bare-footed and have the backs and fronts of their legs and soles of their feet inspected.

(3) The men of each unit are called in turn for inspection by the medical officer, who now pays particular attention to the back, chest, oral and anal regions.

(4) Treatment, progress, and weight are noted by the medical officer in Army Book 181, and the case sheet is completed.

(5) If an injection is to be given, an orderly hands the man a slip of paper with his name written on it, and then enters the name on the injection list.

(6) Each man to receive an injection then enters the injection room, hands his ticket to the orderly in charge, who gives him a test-tube into which he micturates. The test-tube is then placed on a stand and the man's ticket is fixed opposite it.

(7) Before injection the urine is tested for albumen.

(VI)—DIETS AND EXTRAS

28. It has been the experience of the Committee that men suffering from venereal disease, especially gonorrhoea, have been kept on a restricted diet for an extended period as a disciplinary measure. Considering the fact that a liberal diet is essential for the efficient treatment of many cases of venereal disease, it is thought advisable to draw attention to the necessity for medical officers to remember that these cases require as much thought and care with regard to dieting as other cases in hospital, and that discrimination should be duly exercised in the matter. It is recognized that a milk diet may be necessary in some cases, but such a diet should never be given for disciplinary purposes.

(VII)

29. The fatigues of the hospital could be done by non-infective patients.

(XII)—TREATMENT

44. *Treatment of syphilis.*—The following course of treatment is recommended :—

First Course.—Nine weeks' treatment, nine injections, one a week, nine grains of mercury.

Five weeks' interval.

Second Course.—Three months' treatment, six injections, one a fortnight, six grains of mercury.

Three months' interval.

Third Course.—Three months' treatment, six injections, one a fortnight, six grains of mercury.

Five months' interval.

Fourth Course.—Six months' treatment, six injections, one a month, six grains of mercury.

Total.— $23\frac{1}{2}$ months' treatment, 27 injections, 27 grains of mercury.

N.B.—The above scheme is given as a guide only, and it must be understood that modifications may be necessary to meet the requirements of individual cases.

45. The efficacy of the mercurial treatment of syphilis is much enhanced by the use of hot-air baths.

46. The use of arylarsonates in the prophylaxis and treatment of syphilis was considered. The Committee concluded that the utility of these preparations as a prophylactic against syphilis has not been proved, and does not recommend their administration for this purpose. But in the treatment of syphilis, judging mostly from the results obtained at the Military Hospital, Rochester Row, the arylarsonates may be considered a satisfactory substitute for mercury in certain cases, and especially in those cases which cannot tolerate mercury. However, as regards their lasting effects, no definite opinion as yet can be given.

47. *Treatment of venereal sore.*—The Committee cannot too strongly emphasize the necessity for cases of venereal sore being treated with antiseptic precautions in the treatment room, under the immediate supervision of the medical officer, and recommends as an efficient method the application of liquid carbolic acid, followed by some astringent or soothing dressing, as recommended in paragraph 32 of the Final Report of the Army Medical Advisory Board.

48. After the sore has assumed a healthy appearance, dry antiseptic and astringent powders (e. g. boric acid) applied twice daily have been found most effective, and have the additional advantage of being capable of application without the use of lint, &c. The sore and its surroundings should be cleansed carefully with carbolic lotion (1-40) before the application of the powder.

(XIII)—FITNESS FOR ACTIVE SERVICE

50. The Committee endorses the opinion given in paragraph 22 of the Final Report of the Army Medical Advisory Board, namely, that 'if the attack of syphilis has been of ordinary severity, especially if no destructive lesions have made their appearance, if no evidence of the malady has been observed during the previous six months, and a course of treatment has been carried out of the character recommended in this report, then the soldier may be permitted to proceed on active service in the field.'

(XV)—REPORTS AND RETURNS

(a) *Syphilis Case Sheet.*

52. The Committee considers that the syphilis case sheet (Army Form I 1238) requires modification. It is suggested that it be a double sheet instead of a single one as at present ; that it be of stouter paper ; that it be provided with horizontal lines in addition to the vertical lines ; and that it be otherwise modified as shown on attached specimen sheet (Appendix IV), the latter to replace the one at present in use.

(b) *Syphilis Register.*

The syphilis register does not contain any valuable information which is not more fully given in the syphilis case sheet. As the latter is passed on with the man's documents to the various stations to which he may be transferred, the Committee thinks that a permanent record should be made at the station where the disease first comes under notice, and that a short history of the case should be entered in Army Book 181 on the man's admission, and notes added, not only when the patient is in hospital, but during the whole time he is under treatment at the station. If this were done systematically a useful store of facts would always be accumulating and be available for reference or study.

(c) *Army Book 181—'Syphilis Record Book.'*

This book should be utilized for entering a short medical history of each case of syphilis admitted to hospital, and for keeping a permanent record of the subsequent medical history, whether treated in or out of hospital, as long as the man remains in that particular station. The heading of each alternate page to be the same as the syphilis case sheet (Appendix IV).

(d) *Special Reports.*

The Committee is of opinion that a special report on all cases of abscess, mercurial poisoning, or other serious accident occurring during a course of intramuscular injection treatment of syphilis should be submitted through the usual channel to the Lecturer on Syphilology, Rochester Row. The Committee is also of opinion that all cases of syphilis in which a recurrence of symptoms takes place after completion of a full course of treatment should also be at once reported to the Lecturer on Syphilology, Rochester Row. The report should give full clinical particulars of the case, and a history showing how long after the sore developed mercurial treatment was commenced, the total amount of mercury given, the duration of the treatment, the doses prescribed, and the length of the intervals between the courses.

INSTRUCTIONS TO SOLDIERS SUFFERING FROM SYPHILIS.

These instructions are given you both for your own sake and to prevent danger of infection to others. Keep the card carefully, and bring it with you each time you report yourself to the medical officer in charge.

You are suffering from the venereal disease called syphilis, which in many cases lasts for at least two years, but which can be cured by careful treatment.

It is a contagious disease, and you must therefore be careful not to give the disease to others by sexual intercourse, kissing, or other close contact, by sleeping in the same bed with others, or by common use of table utensils or your pipe.

The disease cannot be cured by a single course of treatment, and you must expect signs of it from time to time, such as a rash or sores on the skin, sores in the mouth or throat, pains in the limbs and joints. Whenever such signs appear, you must at once see your medical officer. Even if no signs appear, you must report yourself as directed, so that the danger mentioned may be prevented.

If you do not follow the instructions given, and do not continue the treatment, the disease is likely to break out again and again until you may be permanently disabled.

The treatment of your disease, to be successful, must be continuous. You will require to be under medical treatment and supervision, even though no signs of the disease are present, for two

years. You must therefore make a point of attending at the place and hour named by the medical officer.

During the treatment it is necessary for you to clean your teeth with cotton-wool on your finger, or with a soft tooth-brush, early in the morning and before going to bed. In addition the mouth must be carefully rinsed, using the mouth-wash prescribed for you, before and after every meal. If, in spite of this care, you have at any time pain or discomfort in chewing your food or in speaking, you must report 'sick' at once. It is likely that early in the course of the treatment the signs of the disease will have gone, and you will feel perfectly well; but, nevertheless, you must not neglect what you are told to do, or think yourself cured, until the medical officer in charge of you tells you that no further treatment is required.

Foods strongly spiced are likely to produce diarrhoea, and should be avoided; intoxicating drinks should be taken only if permitted by the medical officer. You should smoke as little as possible; it is better not to smoke at all for a time, as the irritation of the tobacco is likely to make your mouth sore. You must keep yourself warmly clothed, and lead a regular active life, keeping yourself as 'fit' as possible.

If you wish to marry you must consult your medical officer, for if you marry before you are cured you will carry the disease to your wife, and your children, too, will be diseased.

APPENDIX IV

MORE RECENT ARMY FORMS AND RETURNS

SYPHILIS CASE SHEET

Regimental No.	Rank and Name
	Corps.....
Station	
When and where contracted	
Number of months under treatment	
Primary sore	
Lymphatic glands	
Skin (nature of rash to be described)	
Mucous membranes	
Other symptoms	

INSTRUCTIONS

1. The first entry to be signed in full by the medical officer, subsequent entries to be initialled ; and, on the case being transferred, the first entry to be signed by the medical officer taking over charge.

2. The record of the last sign of active symptoms to be underlined in red ink.

3. At the end of each course a red line to be drawn across the page, and an entry made in red ink showing when the course is completed, the number of grains of mercury administered during the course, and the date when the next course is due. For instance, the words ' Completed first course. Mercury, 9 grs. Next course due on 6th March, 19 . '

4. In cases of absence from medical inspection, the reason for such absence to be stated.

Station.	Date of admission and discharge from hospital to be entered in red ink.	Mercurial treatment.	Dose of metallic mercury in grains.	Progress and local treatment.	Weight (lbs.) clothed.	Urine.	M.O. initials.

SYPHILIS RECORD BOOK.

Regimental No. Rank and Name
 Corps
 Station
 When and where contracted
 Serial number in register
 Placed on Struck off
 Number of months under treatment
 Primary sore
 Lymphatic glands
 Skin (nature of rash to be described)
 Mucous membranes.....
 Other symptoms

APPENDIX V

SUGGESTED FORM OF ANNUAL RETURN FOR A.M.D. REPORTS

SUMMARY OF THE TREATMENT OF SYPHILIS . . . { Station.
 District Year 19 .
 or Command.

No. of cases remaining on the Syphilis Register from 19			No. of cases struck off the Register on completion of treatment (in 19)		
No. of transfers received from other Commands			No. of cases transferred away [from the Command, still under treatment]		
No. of men who were placed on the Register during 19			No. of cases remaining under treatment 31-12		
No. of men who have been under treatment during the year, or part of the year					

The statistical form in the present annual return affords no useful information and should be abolished. The above form is simple and shows the number of men under treatment at the beginning and end of the year, also, what is more important, the number of men placed on the register for the first time. Transfers must be included in order to balance the two sides, but should be omitted in the Army Medical Reports. In the medical transactions a few notes might be added, as to the number of men

who contracted syphilis at the station (as opposed to imported cases from elsewhere), the number of readmissions during the year, the number of men who had to be replaced on the register after having been struck off on completion of treatment, the number of men who left the army during the year before completing their treatment, the plan of treatment generally employed, any new drug experimented with, and notes of any cases of special interest.

OS Pollock

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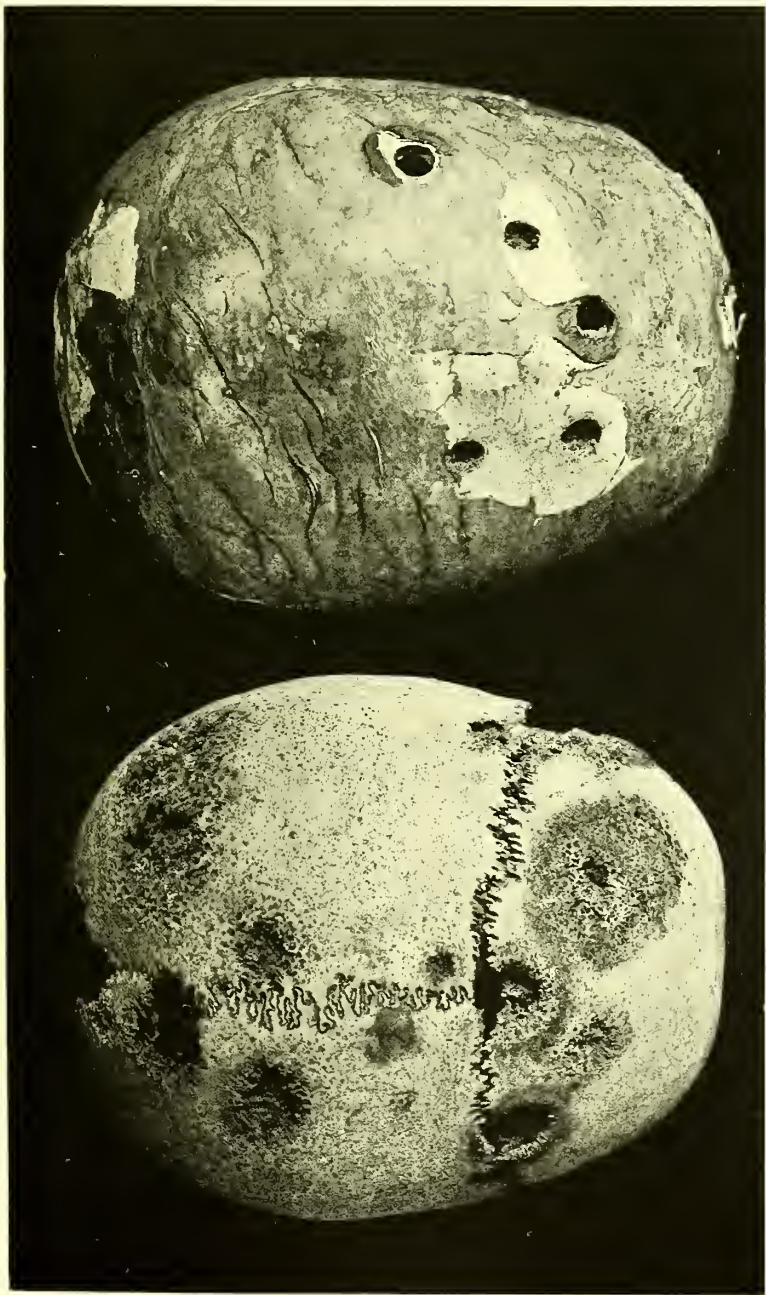








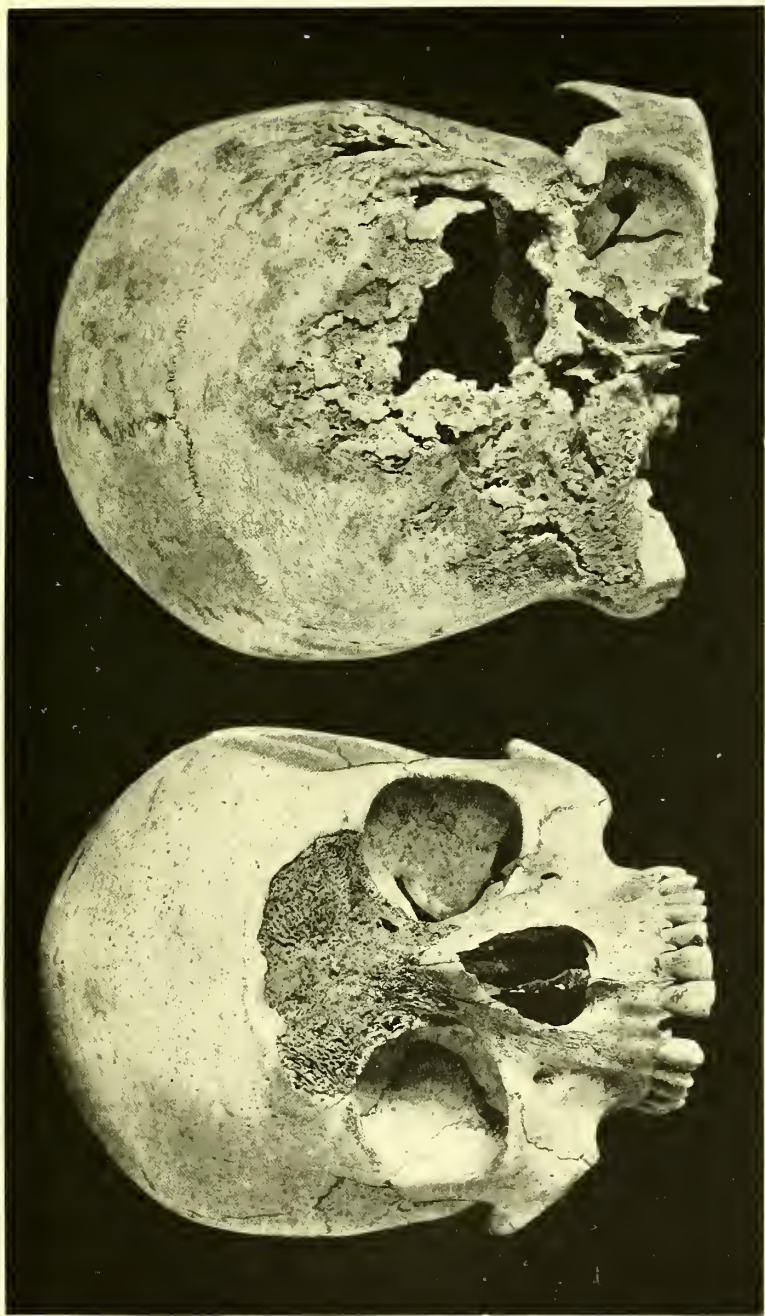
PLATE XI



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PLATE XII



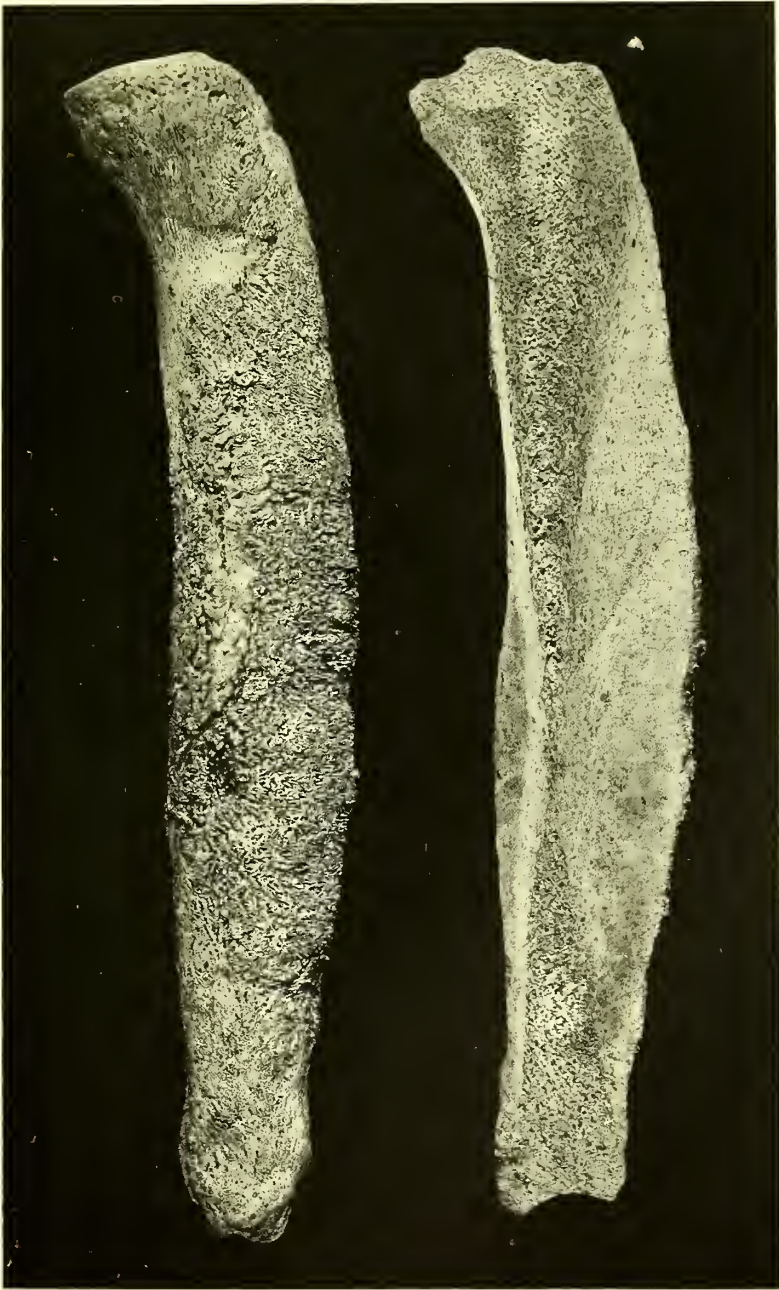
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PLATE XIII



PLATE XIV



NOTEWORTHY FEATURES OF SYPHILIS
IN THE NAVY OF THE UNITED
STATES OF AMERICA

BY

CHARLES NORMAN FISKE, M.D. (HARV.)

Surgeon, United States Navy

CHAPTER XXIV

FEATURES OF SYPHILIS IN THE NAVY OF THE UNITED STATES

FOR many years since disease statistics have been published by the Department of the Navy of the United States of America that service is known to have sustained damage to its personnel from syphilis, approximating one sick day for each person each year. Through the courtesy of Surgeon-General Rixey the writer has been enabled to construct from the archives of the Bureau of Medicine and Surgery the accompanying statistical table (Table XI), in which an attempt is made to show the prevalence and damage of this disease in the American navy during the past half-century.

A somewhat intricate analysis of vital statistics relating to a relatively small number of individuals and covering an extended period of time, is always difficult of interpretation, and necessarily susceptible to certain errors which would hardly obtain if larger figures were involved. The absence of uniformity of admission, disposition, and, particularly, of reporting of cases in the naval and military services of the several nations, makes the ready comparison of these statistical reports a difficult task, and, indeed, the constantly changing policies within a single service promote confusion in efforts to arrive at conclusive interpretations in comparing the movements of a single disease within several decades. To appreciate fully the significance of the varying morbidity rate one must presuppose a tolerably succinct familiarity with the history of the service, the movements of its personnel, the methods of recording cases, and the opinions of their economical management and disposition which prevailed during the several periods covered. However interesting and convenient for proper understanding such an exposition might prove, the space available in these pages precludes recital of the details of this history; therefore it must suffice for our purpose to state briefly that throughout the

two decades which followed the Civil War (1861-5), there was an approach to professional dormancy which, from the present-day point of view, affected equally all branches of the naval service; it will be recalled that no active operations, either offensive or defensive, were required, and this fact is reflected in the column of mean strength (see Table XI, p. 314) by the absence of any considerable fluctuation or expansion. To be sure, the average force was, during 1879, about 12 per cent. greater than it was in 1878, and a readily noted attending circumstance was an increase in the admission rate for syphilis from 43.6 to 62.1 per 1,000; assuming that herein existed a relation of cause and effect, it appears that the influence of this relatively considerable expansion declared itself in the admission rate also for the two ensuing years; then, when the strength diminished somewhat, the admission rate declined to 36.9. That such generalized assumption, however, is not justified is at once shown by the fact that the admission rate continued to decline while the service was gradually expanding ten years later; if we are to accept Medical Inspector Gatewood's dictum¹ that 'a higher recruiting rate tends to a higher morbidity rate', and this seems to have been proved as well for venereal as for general infectious diseases and miscellaneous affections, evidently other counter-acting factors must be sought, such as the relative absence of visiting at highly infected ports, an increased percentage of re-enlistments, &c. As a matter of fact the influence of service expansion does not make itself clearly apparent until 1898, the year of the Spanish-American War (42 per cent. increase in actual admissions over 1907), and more especially in 1899, when the admission rate rose from 16.668 to 20.186 per 1,000 of average strength; this rise is just what experience would forecast for the year following a considerable increase in personnel. It is proper in considering all admission rates, particularly for disease, that, in such a floating population as until recently the naval service represented, the number of cases are derived from a much larger number of individuals than the average strength would indicate, namely, from all the persons who were in the service during the year. It is conceivable that one recruit might be

enlisted, contract syphilis, and be discharged for some reason each month of the year, and therefrom twelve cases (persons) would be represented by but one in the average strength ; to be sure, some, but not most, civil communities have a population quite as fluctuating. As the percentage of continuous service men increases, the admission rate would be expected to fall, and this may partly account for the decidedly more satisfactory rate since 1906 ; in 1907, 57 per cent., and 1908, 65 per cent. of all men discharged and entitled to re-enlistment actually did return to the service, and of all men who left the active service by discharge, retirement, or death during 1908, nearly 35.5 per cent. re-enlisted ; formerly the number returning was comparatively negligible. An annual census of infected persons in the service, as advocated by Rho,² Cagnetti e de Amicis,³ and others, has never appeared practicable in the United States navy.

The most recent rise in admission rate for this disease began in 1903, and seems to be the direct result of a steady expansion, but even five years ago another limiting factor appears to have tended to keep the admission rate for syphilis from rising proportionally to recruiting, and that is the new and sturdy type of men enlisted in the vast rural districts west of the Mississippi river ; these men are generally admitted to possess moral—as well as physical—stamina far above that found in the lower types which were formerly recruited from the seaport towns. It will be noted that during 1898 the number of sick days did not materially increase, notwithstanding the rise in admission rate above that of 1897 ; this is, of course, due to the large number of invalidings from the service in time of war to make room for patients deemed more worthy of the consideration which protracted hospital treatment represents.

During 1903 and 1904 the invaliding figures and, particularly during the latter year, the number of days on the sick-list indicate a wave of probably justifiable impatience, and the attitude that such cases as did not readily respond to treatment must be discharged. Again, the policy is gradually becoming general, not to retain in the service luetics who are not promptly benefited by treatment, and some officers, probably wisely, advocate invaliding

from the navy all cases as soon as open secondary lesions are healed (as being of comparatively little danger to the public), except long service men, efficient petty officers, and others who are sufficiently valuable assets to justify the Government in the hazard of retaining them for future service. The disposition of officers has proved a more difficult problem, and while in practice they have been almost uniformly retained, in theory it is generally admitted that the same principles should apply, and the younger irresponsible ones probably ought to be invalided for the good of the service. Recognized cases of *sypilis insontium* are rare, and while they present embarrassing features, every effort is made to assure justice to the individual by cure, retirement, or other benefits. A few medical officers are known to have contracted the disease in the line of duty, and occasional reports of other probably innocent infections are rendered, of which the following, by Assistant-Surgeon J. L. Belknap ⁴ in the Annual Report for 1905, is typical:—

‘A private in the marines, 23 years and 10 months of age, was admitted to the hospital giving a history of ‘sore throat’ of about three months’ duration. He had been treated for ulcerative tonsilitis without improvement. Examination showed his throat to be reddened, with the left tonsil much enlarged, indurated, and containing an ulcerating fissure, about three-fourths of an inch long; there were one or two small mucous patches on the posterior pharyngeal wall; a firm, but slightly tender, lymphatic gland about the size of a walnut was found below the left mandible; numerous small, hard, discrete, painless, freely movable lymphatic glands in neck, axillae, and groins; many small oval or circular erythematous macules were scattered over the trunk, arms, and thighs; there was no evidence of any form of lesion on the genitals.

After admission he complained of nocturnal headaches, insomnia at times, and numerous rheumatoid pains. His condition has improved rapidly under mercurial treatment, especially his throat, as the left tonsil is now much smaller and less indurated, and the gland below the left jaw is about half the size it was on entrance. The patient denied any venereal origin, but stated that he had been in the habit of smoking a friend’s pipe. The friend had been treated for sypilis in the same hospital only a few months ago.

The writer, while medical officer of the *Mohican* in 1902, was confronted with the unsolvable problem of an otherwise healthy boy apprentice of 17 years who applied for advice early, presenting characteristic secondary lesions without any discoverable site of primary infection, although systematic search was repeatedly made over the entire surface of the body and of every

possible mucous surface ; those who knew and questioned him believed his statement that he had never experienced coitus and had not had intimate contact with any person of either sex for many months. It is not considered good policy, for aesthetic reasons, if for no other, to retain syphilitic members of the hospital, messmen, or commissary branches.

The first comment that one, unfamiliar with the history of venereal records, would be tempted to make would be one of satisfaction that the incidence rate is much below that of thirty years ago, but such an impression would probably be misleading, and the efforts of some of our progressive and best informed military surgeons⁵ to awaken the general public to the awful magnitude of the venereal peril may still prove unavailing. All venereal statistics compiled from the records of unscientific observations represent many errors in diagnosis, not to mention omissions of cases unobserved, and writers frequently resort to the aid of co-efficients to approximate the figures to the facts. Gatewood,⁶ for example, prefers estimating the number of cases of gonorrhoea upon the assumption that 2 per cent. of all gonorrhoeal subjects develop gonorrhoeal rheumatism, to accepting the admissions for gonorrhoea as published in annual health reports for the navy, and Hoff⁵ assumes that one-half the admissions in the army for syphilis prior to 1880 represent chancroidal infection. Chancroid was recognized four years earlier in the annual reports of the Surgeon-General of the Navy, but interviews with the older medical officers would indicate that this distinction was not so promptly appreciated by practitioners at large and that, perhaps, one-third of the admissions for syphilis of thirty years ago were really only chancroid, and the number of sick days would seem to support this view ; in those days comparatively fewer cases of primary syphilis were readmitted as with secondary (*S. consecutiva*) than is the case to-day ; the relatively few which would be thus counted twice would probably only compensate for the undiscovered cases. For these and other reasons it has seemed wise to include in the table a separate column to show the admissions for primary syphilis, which may be subtracted from the total admissions (both *S. primitiva* and *consecutiva*) as judge-

ment dictates. Gatewood⁶ holds the opinion that 'the actual prevalence of syphilis may be considered as shown by its admission ratio'.

The foregoing discussion has been entered into in order that students interested in pursuing the subject further may be governed by the proper controlling factors, and it now remains to develop the facts of greatest present importance, namely, the immense amount of damage which this disease inflicts upon the Government's interests, and the prospects of reducing this damage.

In drawing conclusions from the statistics of syphilis during the last decennium, the Surgeon-General's report⁷ for 1909 says: 'From the above is adduced the fact that the Government not only loses the services, but must defray all the expenses of illness of approximately 1,000 men for an extra month out of every year, on account of this single venereal disease.'

In the last column of the table an estimate of the total damage in loss of service will be found, determined somewhat after the method described in Gatewood's⁸ 'Naval Hygiene'; this column may be found of value for purposes of comparison of the actual loss for each year, but, to do justice, the navy's expansion during the last decade should always be borne in mind.

The sanitary reports of most navies indicate that the admission rate for all venereal diseases is higher on foreign stations, and, as in the 1906-7 'Sanitätsbericht über die Kaiserlich Deutsche Marine',⁹ p. 84, they infer that disease is more prevalent in other countries; it seems reasonable to assume that the absence of home ties fails to exert that restraining influence which is proverbially lacking 'east of Suez'.

It cannot be said that the frequency of the various types of the disease encountered in the naval service differs at all notably from those observed in civil life; there appears to be no evidence of such varieties being contracted by its men, as have been reported by Jeanselme or Scheube¹⁰ from the Orient, although atypical cases with few secondary and early malignant tertiary manifestations are occasionally encountered, which are obstinately resistant to the customary treatment; physical

deterioration from protracted tropical service is usually assigned as the cause of failure of mercury given by ingestion or inunction to control the specific poison, and recourse is commonly had to hypodermic or intramuscular injections. Occasionally a case with severe secondary symptoms is met which will hardly respond to any slow method of medication, and daily calomel fumigation seems most efficacious. Plate XV at the end of this article is of a patient treated by the writer ; a few days prior to the taking of the photographs the man was delirious from specific fever (105° F.), and within a fortnight after calomel vapour baths his skin was nearly clear.

The management of cases in the navy is peculiar only in the matter of control and prophylaxis.

To avoid danger and disgust to his shipmates, whenever practicable the patient is transferred to hospital, or hospital ship, as soon as the diagnosis is made, and with the modern methods of dark-ground illumination, as advocated by W. Scholtz¹¹ and Passed Assistant-Surgeon Mink,¹² and fully described by Capt. L. W. Harrison (pp. 140-6 of the present volume), or with the smear-staining technique of Bassett-Smith,¹³ the *Treponema pallidum* should be observed early and before infective secondary lesions appear. Naval and military services have peculiarly cogent reasons for demanding the earliest possible diagnosis of this disease, and the elimination of 'the expectant period of no treatment', for not only will exposure of others be better controlled thereby, but, as Mink has recently shown, the saving of but ten days in the treatment of each case would prevent the 'unproductive expenditure' of thousands of dollars in pay, and a correspondingly unjustifiable loss in efficiency. 'An earlier diagnosis may be considered obtainable by one of two methods : first, the recognition of a characteristic primary sore ; second, the recognition of the specific organism by stains, or the dark-ground illumination. In connexion with the first method let us consider the percentage of cases of syphilis diagnosed as *syphilis primitiva* (Plate XVI). It is apparent that as the knowledge of chancroid as a non-syphilitic lesion increased, medical officers became more and more unwilling to make the diagnosis of primary syphilis. Thus,

in 1903, only one case in ten was diagnosed from the primary lesion. Shortly after this came the discovery of the specific organism by Schaudinn. However, the rise in the curve is so premature and disappears so completely that we are led to conclude that the results from staining methods represent a combination of over-enthusiasm and confusion of harmless spirochaetes with the *Treponema pallidum*. To those who have compared the results obtained with dark-ground illumination its superiority as an accurate instrument of diagnosis over all staining methods must be at once evident. If this instrument continues its present satisfactory work its expense cannot be used as a counter-argument, since one in a fleet is sufficient. Moreover, the reduction of the average duration of treatment by one day would save enough money to equip each vessel in the Atlantic, Pacific, and Asiatic Fleets.'

If the case must be cared for on board a crowded ship, use of a special drinking cup, mess gear, toilet and bathing facilities are mandatory. The sanitary scuttle-butt with bubbling spring terminals, devised by Surgeon Gates,¹⁴ is gradually being fitted upon modern warships, and, in common with other infections, the fear of innocently contracting syphilis at the common drinking fountain is thereby dispelled. It is not good policy to permit a syphilitic whose disease is supposed to be arrested to serve on torpedo boats and other vessels not carrying a medical officer.

Court-martial prisoners undergoing confinement have long proved most unsatisfactory cases when invalided to naval hospitals by reason of syphilis or scabies, and the problem is only now being solved by the establishment of infirmaries in the prisons, or prison wards in the hospitals. It has been too long evident that many patients have considered aggravation of local symptoms to be to their interest in keeping them out of prison; mucous patches in the mouth may be almost indefinitely prolonged by the persistent and surreptitious use of tobacco and other irritants, and in such cases the administration of specifics must be confined to such methods as the medical officer can assure himself are thoroughly pursued. Wherever practicable, tent life tends to promote speedy recovery from the ulcerations and anaemia.

Debilitated patients from the engineer's department convalesce rapidly from this disease while living in tents.

Surgeon Rothganger,¹⁵ on the U.S.S. *San Francisco*, in 1902-4, in advocating early excision of suppurating lymph nodes from whatever cause, says, 'In the suppuration of the initial enlargement of syphilis, primary union was secured in four of the six cases.'

Fortunately, secondary syphilis is comparatively seldom observed among those recently recruited; the writer has, however, known a recruit to be surveyed and recommended for discharge from the service on account of alleged syphilis, when the fairly general pigmentation of the skin and enlargement of lymph nodes was known to be the result of a recent scabies infection from which he had been cured before enlistment.

No record has been found to indicate that syphilis has ever been conveyed by vaccination in the navy of the United States, but available published reports do not cover the first half of the nineteenth century, when human lymph was so widely used. As the type and self-respect of the naval personnel becomes higher, the degrading practice of tattooing becomes less generalized, yet its prevalence still demands that the ship's surgeon shall take steps to render specific infection impossible, and he now usually avails himself of the opportunity, in talks to the crew upon personal hygiene, to discourage a continuance of this disfiguring custom; if tattooing is to be countenanced or tolerated, the danger of infected needles, to which Jenny¹⁶ has called attention, indicates that operators should be required to take aseptic measures.

While, as implied earlier in this chapter, certain factors of evolution have doubtless contributed to a reduction in the admission rate, the service is now felicitating itself that individual venereal prophylaxis is largely responsible for the diminished rate since 1906; this is the more noteworthy because the enlisted men's pay has recently been increased 10 per cent., and more spending money usually means more licence while on liberty, even although 19,809 men registered savings deposits last year.

Venereal prophylaxis has been attempted and quietly prac-

tised by a number of medical officers for some years, but, so far as the writer is informed, no energetic and systematic campaigns were instituted¹⁷ in the United States navy until 1907, and it was not until December 17, 1908, that this procedure was favoured¹⁸ by the weight of official departmental approval. While various schemes are still being tried out, some succeeding where apparently others have failed or would not be practicable, briefly, venereal prophylaxis in the naval service now comprises a campaign of education conducted by medical officers in connexion with 'first aid' instruction to successive sections of the crew, and the unobtrusive distribution of 'Confidential Circular of Information No. 1', the text of which follows:—

WARNING CIRCULAR.

1. To have sexual relations with any woman who practises prostitution exposes you to very painful and life-endangering diseases of long standing, which may be transmitted to your future wife and children, rendering them mentally and physically defective.

2. A prostitute presenting a physician's certificate of health proves thereby only that she *was* in health when examined. She may have contracted a dangerous disease a few minutes after the examination.

3. The mouth secretion in such women is often capable of transferring disease, hence kissing, or the use of a cup or glass, spoon, fork, &c., which may not have been thoroughly cleansed after being used by a prostitute, may transmit syphilis with its horrible consequences.

4. The fact that a prostitute appears clean and free from the signs of disease does not prove her so. The absence of disease can be established only by a very complex medical examination.

5. If, with a knowledge of what little has been told you herein, you will risk your health and life, you must endeavour to protect yourself and those about you by a simple treatment to be obtained upon application at the sick bay and used as soon as possible after returning from liberty. No man who has been exposed to venereal infection ashore should neglect to seek the treatment to be obtained at the sick bay promptly upon return from liberty. Remember that to conceal a venereal disease you lay yourself open to severe punishment.

A copy of each day's liberty list is furnished the medical department, upon which—opposite each man's name, upon his return to the ship—is checked his denial or admission that he has exposed himself by intercourse; his statement is accepted by the hospital attendant and, if affirmative, he is given opportunity to thoroughly cleanse the parts with soap and water, and on some ships with mercuric-chloride solution; this is followed by a urethral injection of some disinfecting solution (usually of an

organic silver preparation) which is retained for several minutes ; the next step is the thorough application, by rubbing into the glans and prepuce, of a 30 per cent. calomel ointment. If venereal disease develops after a denial of coitus, after due consideration of the probable incubation period, disciplinary measures for a serious infraction of regulations are in order. Some medical officers, particularly on the small ships, conduct physical inspections before the men are allowed to go ashore, after their return, or at irregular intervals, as varied experience may dictate. Men are usually deprived of shore leave while suffering from venereal disease. Each syphilitic is furnished with a copy of ' Confidential Circular of Information No. 4 ', a copy of which follows :—

INSTRUCTIONS FOR THOSE HAVING SYPHILIS (LUES, POX, BLOOD DISEASE).

Syphilis is a treacherous and dangerous disease of the entire system. It is curable, but is only cured by a long course of treatment, lasting for several years, even when there are no external signs of the disease. A perfect cure requires at least two, preferably three, years of faithful treatment, because it is ' in the blood '. Healing the chancre and taking the medicine for a *few weeks or months*, until the visible signs of the disease disappear, will not cure your blood of the syphilitic poison. It is therefore necessary that you follow the doctor's orders most carefully. If you do not, you are in danger of having the disease appear in the future in some important part of the body, like the brain, spinal cord, bones, arteries, or other organs, as the liver. If you do not follow directions, it is also possible that your wife and children will acquire the disease from you. Syphilis is extremely contagious, especially by the sores and erosions, however small they may be, which generally occur on the genital organs and in the mouth, but which may be produced in any part of the body. A patient with syphilis must, therefore, abstain from any sexual intercourse, during the first year especially, when he has even the smallest evidence of a sore or break in the skin on the genital organs. He must also abstain from kissing when he has sores on the lips or tongue or in the mouth, for a kiss, even on healthy skin, may be dangerous. The disease may also be transmitted through the medium of any object which has been in contact with the secretions of the disease—glasses, toothpicks, spoons, forks, bottles, pipes, plug tobacco, cigars, cigarettes, linen, towels, brush, comb, soap, razor, clothing, mess gear, &c. ; in fact, any contact with a syphilitic person or the secretion of the disease is dangerous. It is very important for a syphilitic subject affected with any other illness to always inform the doctor of his former syphilis, for this knowledge may be useful for the direction of treatment and the cure of the complaint, even when the syphilis is long cured. It will therefore be entirely to your own benefit for the doctor to know about your syphilis.

The following directions are of particular importance during the first year and whenever, if you neglect yourself, the symptoms break out again :

1. *Alcoholic liquors in all forms must be avoided*, because alcohol is a poison

which, added to the poison of syphilis, makes the syphilis much less likely of perfect cure.

2. *Do not smoke or chew tobacco*, because the irritation of the tobacco increases the severity and duration of the mouth sores of syphilis, and *sour, acid, peppery, and spicy foods and pickles* should be avoided for the same reason.

3. *Brush your teeth and wash your mouth* every night and morning. Cleanliness of the teeth and mouth decreases the severity and duration of the mouth sores of syphilis.

4. *Have the dental surgeon treat your teeth* if they are bad. Tell him that you have syphilis, so that he may take precautions against catching the disease himself or giving it to other patients.

5. To avoid giving the disease to your family, friends, or shipmates, observe the following rules strictly :—

(a) Always sleep alone.

(b) Always use only your own toilet articles, such as towels, brushes, combs, shaving brushes, razors, soaps, &c.

(c) Have your own razor and shave yourself.

(d) Have your own mess gear and keep it apart from others.

(e) Always keep for your own use only, any articles which have been in contact with your mouth, such as tooth-brushes, toothpicks, pencils, pipes, cigars, cigarettes, forks, spoons, cups, &c.

(f) Always avoid kissing any one, especially young children, and especially during the active period of the disease (the first two years). The innocent party can hardly escape infection with syphilis if you have open sores in the mouth.

(g) Always burn or throw overboard all dressings which have been in contact with sores or wounds.

(h) If you disobey these instructions, you will certainly give the disease to innocent persons.

Remember that the Navy Regulations require that you should not conceal this trouble, but seek treatment promptly from the doctor. Concealment or self-treatment of this disease makes you liable to severe punishment.

The writer has said elsewhere :¹⁹—

The Navy Department has not yet been able to decide that the German method of carrying a packet of prophylactic medicaments for use ashore with ‘malice aforethought’ is practicable for the higher order of enlisted men which we are now recruiting. . . . Astonishingly favourable results have been repeatedly reported during the year, to the extent that, on numbers of vessels visiting the same highly infected ports, where venereal disease was formerly the rule, a reduction of from 75 to 95 per cent. has been obtained.

Because this system of prophylaxis has not yet been adapted to the problems with which many of the ships are confronted, and but one of the smaller fleets has provided a uniform routine for a full year, the statistical table does not demonstrate that the problem is solved ; it is still too early to proclaim dogmatically the service’s independence of the proverbial disregard of civil communities for venereal disease, yet, out of 6,083 liberties from

the U.S.S. *Charleston* (complement 836) during the five months of venereal prophylaxis, not a single case of syphilis developed. Statistics on this ship for the full year 1909 show that out of 12,912 liberties 11,898 or 92.14 per cent. reported at the sick bay, and of these 6,412 or 53.89 per cent. admitted exposure and received prophylactic treatment. Of the 148 admissions (1.15 per cent. of the liberties) for venereal disease (gonorrhoea 80, chancroid 66, and syphilis 2) 34, including both cases of syphilis, developed among those who failed to report, 21 denied exposure, 32 overstayed liberty, 37 had extended liberty, and 24 developed disease in spite of treatment, the latter number representing 0.4 per cent. of failures in 'timely prophylaxis'.²⁰

Medical Inspector Diehl,²¹ U.S. Navy, as Fleet-Surgeon of the United States Asiatic Fleet has caused the following form of report to be submitted monthly by the senior medical officer of each ship and shore station in the command, and from data covering the calendar year 1909 from very nearly all sources has adduced some statistics and conclusions which, from the number of individuals and the wide experience involved, are deserving of careful attention and study :—

MONTHLY REPORT ON PROPHYLAXIS IN VENEREAL DISEASES.

U.S.S. _____

Month of _____ 19 _____

Should include admissions during current month only, no readmissions.

Total number of returns from liberty shown by ship's records _____
(Should agree with total 'Admitted exposure', 'Denied exposure', and 'Failed to report'.)

<i>Returned.</i>	<i>Number reported.</i>	<i>Admitted exposure.</i>	<i>Per cent.</i>	<i>Denied exposure.</i>	<i>Per cent.</i>	<i>Failed to report.</i>	<i>Per cent.</i>
On time * . .							
Over time . .							
Extended liberty							
Totals . .							

* Twenty-four hours or less.

VENEREAL DISEASES.

Total number of cases _____

Per cent. (based on total returns from liberty) _____

Probable causes.	Classification of cases.			Total.	Per cent of total cases.
	Gonorrhoea.	Chancroid.	Syphilis.		
Failed to report . . .					
Denied exposure . . .					
Failure of treatment (admitted exposures) . . .					
Overstayed liberty . . .					
Extended liberty . . .					
Treatment early * . . .					
Treatment late † . . .					
Totals . . .					

* Within twelve hours of exposure.

† Excluding 'Overstayed liberty' and 'Extended liberty'.

Percentage of failure of treatment when given early (based on total number 'Admitting exposure') _____

REMARKS (additional facts bearing on failure of treatment when given early):

Very respectfully,

Surgeon, U.S. Navy.

Third Squadron Commander,
United States Pacific Fleet.

Diehl summarizes the results for the year as follows:—

Total number who went on liberty	70,954
Number who reported upon return from liberty	65,635 or 92·5 per cent.
Number who failed to report upon return from liberty	5,319 or 7·5 per cent.
Number who admitted exposure and received treatment	21,166 or 32·2 per cent.
Number who denied exposure	44,469 or 67·7 per cent.
Total number of primary venereal admissions during 1909 (gonorrhoea, chancroid, or syphilis)	599
Percentage (based upon number going on liberty)	0·84
Total number of cases (599) classified, with reference to probable cause:	
Failure to report	113 18·86 per cent.
Denial of exposure	85 14·19 per cent.
Overstaying liberty	85 14·19 per cent.
Extended liberty	140 23·37 per cent.
Failure of treatment	176 29·38 per cent.
Failure of treatment (based upon total number admitting exposure), eighty-three hundredths per cent. (0·83 per cent.).	

The above covers the entire year of 1909. During the last six months the cases have been further classified as follows:—

Total number of cases during this period, 373, viz. Gonorrhoea, 246 ; Chancroid, 108 ; Syphilis, 19 ; subdivided, with reference to cause, as follows :—

Failure to report	66 (Gon. 48 ; Chan. 13 ; Syph. 5).
Denial of exposure	43 (Gon. 23 ; Chan. 17 ; Syph. 3).
Overstaying liberty	43 (Gon. 33 ; Chan. 10 ; Syph. 0).
Extended liberty	106 (Gon. 70 ; Chan. 30 ; Syph. 6).
Failure of treatment	115 (Gon. 72 ; Chan. 38 ; Syph. 5).

The full scheme of prophylaxis was not in use in all the ships from the very first, those happening to be on detached duty falling into line as soon as they became aware of its adoption, and stations on shore have adopted it only recently. At the latter no liberty list is made out. Men go and come at irregular times, and checkage similar to that on board ship is impracticable. Men are, however, ordered to report for treatment after exposure, and if they develop disease it can readily be ascertained whether or not they took treatment. In the total number of men reported as going on liberty, only those on shore stations who reported for treatment are included. Nor does this report include readmissions for recurrence of disease, for sequelae, nor on account of transfers. The cases reported were all primary admissions, the disease having developed within the period covered by the report, and are classified as cases of gonorrhoea, chancroid, or syphilis.

The number 70,954 reported above as going on liberty of course does not include every man, but it does cover most of those going from ships during the year.

Liberty was given in all the principal ports on the station, from the southern Philippine Islands to Vladivostok, and the ports visited probably represent the two extremes of cleanliness as regards venereal diseases. At Cavité, Manila, and Olongapo, prostitution is under police supervision, and medical inspections are regularly made. In Japanese ports the same system is supposed to be in use, although clandestine prostitution reduces the value of the system as affecting enlisted men. Chinese ports are notoriously unclean, although some of the men serving on vessels habitually stationed in one or two ports, consort each with some one woman. On the other hand, the ' sampans ' hanging about the ships and generally handled by women offer opportunities for promiscuous exposure. So the average conditions to which men serving on this station expose themselves may be regarded as similar to those in any other part of the world. The duration of liberty, which is an important factor in the present scheme, generally extends from one afternoon until the following morning.

The percentage of ' failures to report ' upon return from liberty was 7.5. There have been monthly fluctuations in this percentage, but the average for the last half-year is about the same as for the first, indicating no improvement in this particular. This fact is to be regretted, as 18.86 per cent. of the total number of venereal admissions is attributed to this cause. As this is one of the controllable causes that reduce the efficiency of the scheme, it should receive more consideration than it has. As already stated, men who fail to report are restricted ' for observation ' for a period of at least three weeks. But it appears that this

restriction and daily inspection are not sufficiently disciplinary to compel compliance with the order to report and more severe measures would seem to be indicated.

The percentage of 'denials of exposure' was 67.75. There has been a constant monthly increase of this percentage, and this, or what amounts to the same thing, a steady diminution of the number admitting exposure, may have some ethical significance. The prominence given to the question of venereal disease by commanding and medical officers, the talks on personal hygiene, the institution of the prophylactic scheme in itself, have, in the writer's opinion, been beneficial by bringing the better class of men to a greater realization of the evils frequently resulting from exposure, and by stimulating the latent moral sense. In any event, there is no reason to think that a sense of security engendered by the scheme has caused any increase in indulgence. The claim that the scheme will cause a greater number of concealments of disease has also been refuted on the *Charleston* by a recent examination of the entire crew, not a single case of concealed disease being found.

The percentage of cases attributed to 'denial of exposure' and consequent non-treatment was 14.19, nearly the same as that due to 'failure to report'. If failure to comply with the order to report be considered an offence, still more should be a deliberate falsehood. A man who exposes himself and fails to take advantage of the means provided for the prevention of resulting disease, or who evades treatment by a deliberate falsehood, deserves no consideration and should be punished to the full extent allowed by regulations, which, if necessary, should be amended to meet the situation. It is in this particular that the support and co-operation of the commanding officer is necessary to render the scheme effective. It occasionally happens that a latent, supposedly cured gonorrhoea is lighted into activity by alcoholic indulgence without venereal exposure. In these cases men can honestly deny exposure, and it becomes a perplexing question whether their statements should be accepted or not. If they admit knowledge of the existence of uncured gonorrhoea with occasional discharge, and have failed to report it, they have to this extent concealed it and should suffer the penalty. In the absence of positive evidence it is, however, better, in these cases, to accept the men's statements, and to restrict and keep them under treatment until the certainty of a cure is established. Medical officers occasionally discharge a man as cured too soon. On the *Charleston* it is the practice to keep a man under observation for at least three weeks after all discharge has ceased and all treatment discontinued.

14.19 per cent. of the total number of cases are attributed to overstaying, and 23.37 per cent. to extended liberty. By the former is meant those cases occurring among men who remain ashore after the expiration of authorized liberty and who consequently fail to get timely treatment. Their delinquency is usually associated with excessive venery and alcoholic indulgence. This class is the one to whom prophylaxis is least applicable. But as they are generally restricted to the ship for a long period after their return, ample time is afforded for treatment and opportunities for fresh exposure are greatly reduced. A few of these cases might remain sufficiently responsible to avail themselves of the means which will be suggested further on, but, as a rule, their complete subjugation by liquor will prevent the success of any scheme. By the latter (extended liberty) is meant those cases occurring among men who have authorized leave for a longer period than the usual liberty period, and among this class has also been included those cases in which treatment was delayed for more than twelve hours after exposure.

The new form, already referred to, will, however, report the latter as a separate class. From the very fact that they are granted this privilege they generally represent the better class of men and those willing to use the preventive means if available.

We now come to those cases attributed to 'failure of treatment', constituting, on this report, 29.38 per cent. of the total number of venereal cases. This figure, however, represents a larger percentage than can be fairly attributed to this cause. The scheme was, during the early part of the year, in an experimental stage, and owing to the lack of a thorough understanding of the intent of the form, which was somewhat vague, a number of cases were reported, under this class, that were really due to 'delayed treatment'. It was also discovered that some medical officers were not using the remedies in sufficient strength, a 2 per cent. protargol solution having in some cases caused considerable smarting. In some instances supervision of treatment lacked thoroughness, and some cases may have been recurrent, uncured cases being lighted up by sexual and alcoholic excesses, in which cases prophylaxis is of no avail. It is expected that with the removal of these causes and a greater familiarity with and more thorough application of the scheme, the failures, pure and simple, will be greatly reduced.

The number admitting exposure and receiving treatment was 21,166. Among these 176 or 0.83 per cent. developed disease. Comparing this with the total number failing to report and not treated (5,319) among whom 113 or 2.12 per cent. developed disease, shows a difference which is sufficiently significant without further comment.

Now having, it is hoped, proved the efficacy of timely prophylactic treatment, how can we apply it to those men who still swell the venereal list, those not getting timely treatment on account of overstaying and extended liberty, or among whom treatment is delayed on account of too long an interval between exposure and return to the ship?

The solution of this problem is very simple. The Germans solved it a number of years ago. In their service the remedies are put up in packages of convenient size, consisting of a small collapsible tube, containing protargol solution, fitted with a rounded nozzle which can be inserted into the meatus, and a larger collapsible tube containing calomel (?) ointment, both contained in a paper box with absorbent cotton and printed directions. The packages are for sale in the ship's canteen at a nominal price, the crew are advised to provide themselves with this outfit, which is easily carried in the pocket, before going on liberty, and development of disease through failure to use the treatment is regarded as a military offence. These packages are prepared by a firm in Berlin, and it appears that a firm in the United States has prepared a similar outfit which has been used on board some of our ships. This outfit, with the addition of 'bichloride' tablets, should serve the purpose perfectly. They are a decided improvement upon the bulky 'K' packages used at some of our army posts and upon others suggested by members of our own Service. The German tubes are made of collapsible metal and having screw tops cannot break or leak. The use of this outfit would permit treatment at the time of exposure, and the cases now due to extended liberty or delayed treatment, and probably some cases now due to overstaying liberty, would be eliminated. The necessity for treatment on board ship, with its consequent publicity, inconvenience, interference with ship work, and other objectionable features, would be removed.

The total venereal cases included in this report number 599, or 0.84 per cent. of the total number going on liberty. This includes primary admissions only.

Readmissions for recurrence or on account of transfers are not included. Nor are there included any of the frequent complications or sequelae. This fact, upon comparison, may cause a seeming discrepancy between the number of venereal cases in this article and those entered on the statistical reports from this station; and there are still many uncured cases (syphilis, gonorrhoeal arthritis, orchitis, &c.) on the station which will maintain the number of sick days at a high figure for some time. There are no available data for the comparison of the number of cases included in this report with those reported from this station in former years, and as the number is dependent upon the complement, amount of liberty, and other factors, it is impossible to state to what extent prophylactic treatment has actually reduced venereal disease. It is believed that the application of the scheme has caused more cases to be recorded, which fact has helped to swell the number reported, making comparison with previous years, based on complement alone, unreliable. The recording of venereal cases has not infrequently been neglected in previous years, from the fact that many men continued to perform duty while under treatment; but through the interest aroused by the scheme medical officers now admit all cases for record. The prominence given to the subject has helped to maintain the interest in this usually unattractive class of diseases and will result in greater interest in the individual and better efforts to effect a permanent cure.

Prophylactic treatment does not appear to have disturbed the relation in number of cases usually existing in the different classes of disease. But some facts have been observed which would indicate some effect on the virulence of contagion. It has been observed in the *Charleston* that many of the venereal ulcers classed as chancroid, appearing in spite of treatment, were very small and healed promptly after cauterization, without lymphatic involvement. In fact, it at times became a question as to whether they were real venereal sores or simply an herpetic eruption, possibly due to the irritating effect of the calomel ointment, which is always allowed to remain. The cases were all marked by the absence of any tendency to extend. The few cases of gonorrhoea occurring after treatment appeared less acute. In a few instances the protargol injection was followed by a slight discharge which was, however, free from gonococci, and disappeared in a few days.

As the result of a year's experience and observation, the writer feels justified in submitting the following conclusions:—

That venereal diseases can be almost entirely eliminated from the naval service by timely prophylactic treatment.

That, since venereal diseases cause greater damage to efficiency and loss to the Government than any other, nothing should be permitted to stand in the way of the general adoption of this treatment.

That its efficient application is dependent upon departmental authorization and the co-operation and support of those in command and having disciplinary powers.

That with such support and authorization the medical officer is responsible for the existence of venereal disease and that upon him must fall the opprobrium of its existence.

A report from the U.S.S. *Ranger* shows 'the result of treatment, after thirty-nine liberty parties between Olongapo, Philippine Islands, and Portsmouth, N.H., U.S.A., that there were 256

admitted exposures in either Singapore, Colombo, Cairo, Port Said, Naples, Villefranche, Gibraltar, or Bermuda, without the development of a single case of venereal disease'. It is regretted that the statistics for 1909 were not available at the time the manuscript for this chapter was called for, because they are confidently expected to indicate what may be expected from personal prophylaxis when it is required throughout the service.

In these days of preventive medicine it is submitted that the United States Navy is making strenuous efforts to free itself from the ravages of syphilitic infection.

Charles Piche

TABLE XI

TABLE SHOWING RECORDS OF SYPHILIS IN UNITED STATES NAVY,
1861-1908

<i>Year.</i>	<i>Mean strength Navy and Marine Corps (Medical returns).</i>	<i>Total admissions for syphilis.</i>	<i>Admissions for primary syphilis.</i>	<i>In-validated from service.</i>	<i>Deaths.</i>	<i>Total sick days for syphilis.</i>	<i>Admission ratio per 1,000.</i>	<i>Total damage in terms of number of sick throughout year.</i>
1861	20,000	213*	135*	—	—	—	22-300	—
1862	25,905	620†	377†	—	—	—	23-929	—
1863	40,000	835	502	—	—	—	20-875	—
1864	43,787	1,175	693	—	1	—	26-765	—
1865	32,641	935‡	530‡	—	—	—	28-645	—
1866	17,193	556‡	315‡	—	—	—	32-338	—
1867	10,862§	482‡	273‡	—	—	—	44-375	—
1868	13,310§	447‡	254‡	—	—	—	33-584	—
1869	12,201§	380‡	216‡	—	—	—	31-145	—
1870	10,760§	341‡	194‡	—	—	—	31-691	—
1871	10,763§	380‡	216‡	—	—	—	35-306	—
1872	11,570§	411‡	234‡	—	—	—	35-609	—
1873	12,723§	595	399	—	1	—	46-843	—
1874	13,870§	561	316	—	1	—	40-447	—
1875	10,141§	500	350	—	1	—	49-305	—
1876	11,138§	424	271	—	—	—	38-068	—
1877	7,461	342	207	—	—	—	45-838	—
1878	7,806	341	219	—	—	—	43-684	—
1879	8,869	551	298	19	—	16,925	62-126	55-87
1880	9,003	451	219	22	1	14,641	50-094	51-50
1881	9,546	403	194	18	1	13,740	42-216	47-14
1882	9,371	490	231	22	—	13,898	52-289	49-08
1883	9,197	340	111	29	1	11,398	36-969	46-23
1884	9,959	330	124	24	1	12,817	33-136	47-52
1885	9,191	279	106	19	—	8,392	30-356	32-49
1886	9,188	278	93	21	—	9,530	30-259	36-61
1887	9,618	244	105	11	—	9,356	25-369	31-13
1888	9,955	295	82	16	1	9,436	29-633	34-28
1889	11,219	310	85	18	1	12,196	27-632	42-91
1890	11,768	256	78	8	—	10,095	21-754	31-64
1891	11,501	198	63	19	—	9,489	17-216	35-49
1892	11,775	174	46	16	1	8,629	14-777	32-07
1893	12,109	171	50	14	1	7,739	14-122	28-70
1894	12,520	272	76	21	1	10,605	21-725	40-05
1895	12,671	239	43	14	—	11,965	18-862	39-78
1896	13,768	239	40	21	1	10,239	17-359	38-98
1897	15,229	270	55	29	1	11,289	17-729	45-93
1898	23,038	383	71	78	1	11,720	16-668	72-01
1899	20,113	406	84	45	2	15,415	20-186	65-73
1900	22,977	465	80	78	1	21,791	20-233	99-20
1901	26,101	546	78	73	2	21,656	20-919	96-83
1902	30,249	606	83	69	—	26,794	20-034	107-91
1903	36,535	816	85	132	—	34,112	22-307	159-45
1904	39,450	880	118	125	—	32,389	22-307	150-99
1905	39,620	981	141	92	5	39,632	24,759	157-08
1906	41,690	1,147	143	91	—	41,248	27-513	158-51
1907	44,083	881	96	105	1	32,656	19-985	142-47
1908	50,984	1,001	109	116	2	36,645	19-634	159-12

* Actual admissions for $\frac{1}{2}$ year.

† Less than year.

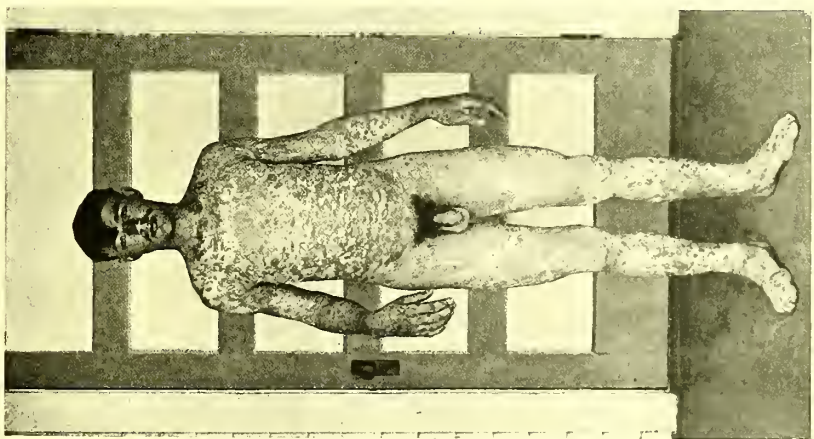
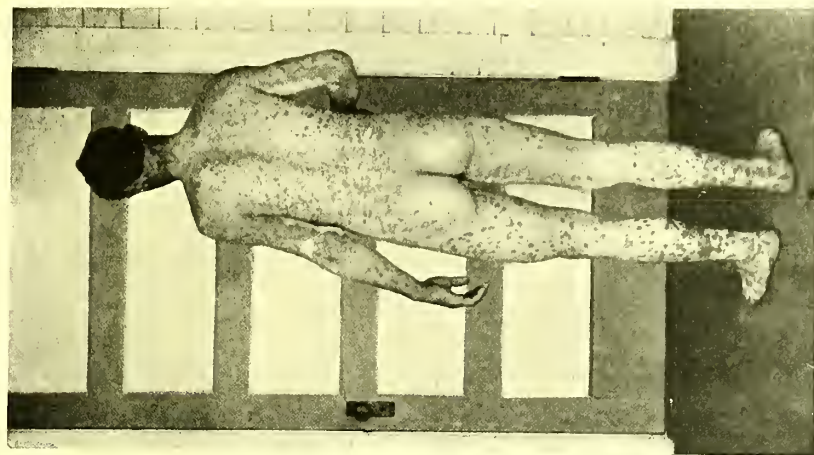
‡ Based upon 37 and 21 per cent. respectively of total actual admissions for genito-urinary diseases.

§ Aggregate force at sea. Force 1861-76 according to Department's figures.

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PLATE XV



Photographs of an extremely severe case of secondary syphilis which responded rapidly to treatment by calomel fumigation.

PLATE XVI

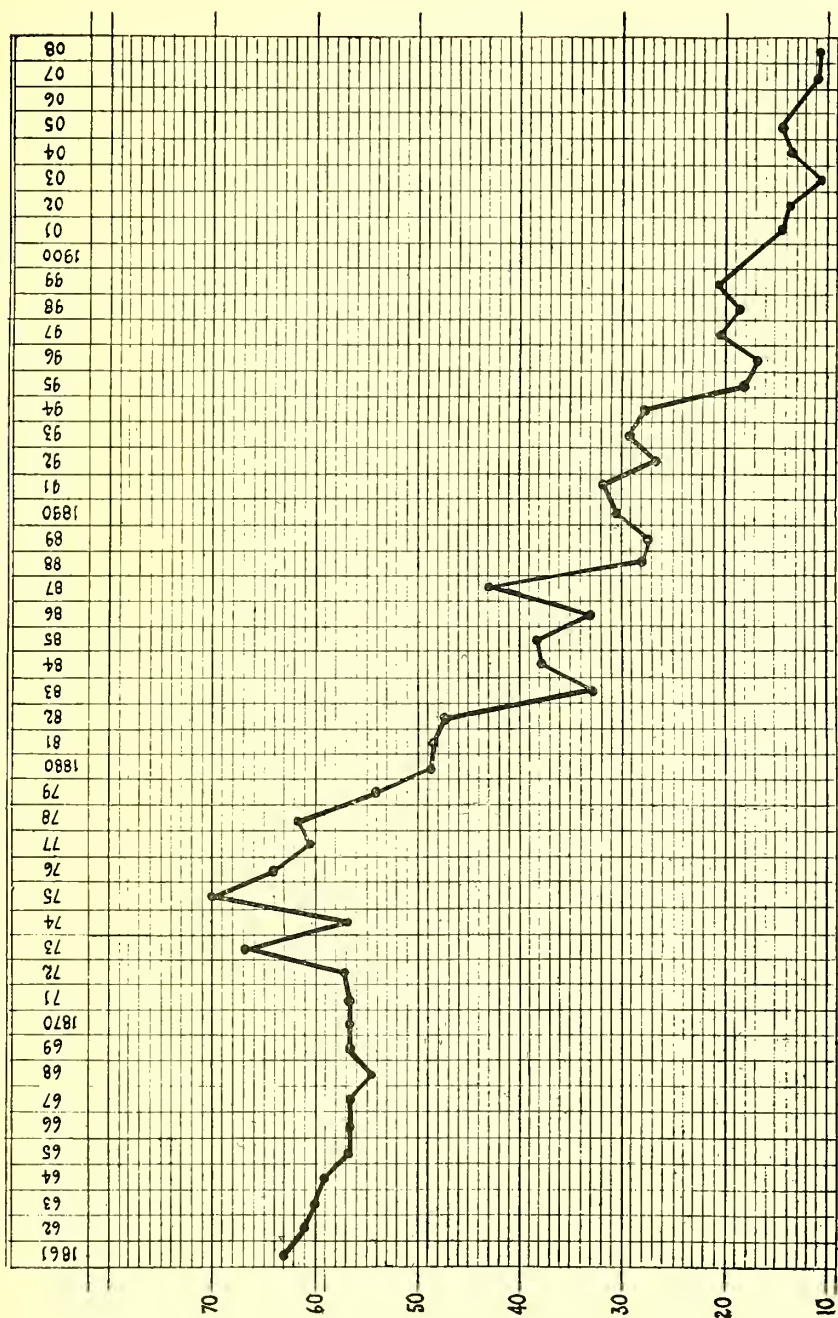


Chart showing the percentage of cases of syphilis diagnosed as cases of 'Syphilis Primitiva' in the navy of the United States.

THE EPIDEMIOLOGY OF SYPHILIS IN
THE ROYAL NAVY

BY

E. P. MOURILYAN,
Fleet-Surgeon R.N.

CHAPTER XXV

INTRODUCTORY

THE data available for an investigation of the early history as to the prevalence of syphilis in the Royal Navy are, unfortunately, very meagre ; mention is made occasionally by naval writers of the existence of this scourge in a more or less marked degree amongst the crews of men-of-war, but no accurate statistics can be deduced therefrom which are of a practical value.

Turnbull, in his ' Naval Surgeon ', published in 1806, writing on the venereal disease, states that it is ' a disease which falls much to be treated by every practitioner, but particularly by those who are employed in the naval department ' ; and he again remarks, ' This disease, like the former one (scurvy), forms the basis of marine practice from its frequent occurrence and the various forms it assumes.'

Sir Gilbert Blane, in his ' Observations on the Diseases of Seamen ', makes but scanty mention of the disease, and it would lead one to assume that, although exceedingly prevalent, venereal diseases were not held to be very important in his time as the returns of sickness in the fleet only account for the three sea epidemics (fever, flux, and scurvy) and other complaints. From a table compiled by Dr. Lind, of cases received into Haslar Hospital, chiefly from the Home Service, from July 1, 1758, to July 1, 1760, out of 5,743 patients, 680 were under treatment for venereal disease and affections connected with it, or 118·4 per mille. During the wars of the eighteenth century naval surgeons were so fully occupied in tending the wounded and combating the ravages of scurvy that they cared little for venereal patients, and thus the disease was relegated to a minor place ; in those times surgeons had to provide their own drugs and instruments for use on board. (A gratuitous supply of the principal medicines was directed in 1796, and an entire issue of

medicines and utensils was provided at the expense of Government, by an Order in Council, dated January 23, 1805.) Moreover, every man suffering from venereal disease had to pay the surgeon of the ship the sum of threepence a day for treatment. Concerning these facts Turnbull (*op. cit.*) remarks :—

In the regulations of naval practice it would appear that for a length of time Government displayed a very shortsighted and rather an illiberal conduct ; and that, by subjecting the men to a particular charge for the disease, they materially injured the service. In consequence of this fine on the seamen they were naturally led to conceal the disease as long as possible, or to put themselves into improper hands for its cure, rather than be subjected to the regulated fee of their own surgeon. Among the other improvements lately introduced, the removal of this way of remunerating the surgeon may be considered as one of the most important to the health of the seamen. The good effects of it are now so apparent that the women who associate with the men are seldomer diseased than formerly ; and the unhappy prejudice which seamen too often entertained, of communicating the disease to a healthy female with a view to be cured of the infection, is done away.

Many of the cases of ulcer and rheumatism noted at this time were undoubtedly due to syphilis.

With regard to the material from which the early reports were compiled, the returns sent in to office by medical officers previous to the year 1822 were found to be of very little value for statistics, being often defective and exceedingly loosely made up ; the journals consisted of three sections, the first column for the ' men's names, ages, qualities, time when and where taken ill ', the second for the ' history, symptoms, treatment, and daily progress of the disease or hurt ', and the third to denote ' when discharged to duty, died, or sent to hospital '.

In 1822 fuller and more comprehensive forms of returns for medical officers were issued, and their execution enforced ; these were, a Daily Sick Book, Monthly or Three Monthly Nosological Returns, and a Journal of Medical and Surgical Practice. From returns sent in to the department of the Physician-General of the Navy, Sir William Burnett, statistical reports on the health of the navy for the years 1830 to 1836 inclusive were compiled and published in 1840. A further series of reports for the succeeding seven years, 1837 to 1843, was brought out in 1849. From 1844 to 1855, with the exception of the reports on the health of the fleets in the Baltic and Black Seas during the Russian War,

1854 and 1855, there is no available information, but from the year 1856 to the present time annual statistical reports have been published.

Hence, it may be said that trustworthy statistics commence with the year 1856, and from that date the tables in this article are calculated. There is a fund of information contained in these annual reports, in the earlier ones especially, collected from the journals of medical officers serving in all parts of the globe. The description of the disease as met with during their practice is very interesting, also their reports on the various methods adopted by foreign governments for the suppression of the disease, particularly during that period when the Contagious Diseases Acts were in force in England and the Colonies; but after the abolition of those legal measures for the protection of the services against the 'venereal peril', it is apparent that the interest in the subject has diminished: the greater or less prevalence of syphilis has been notified in the statistical tables, but the interesting remarks, except in few instances, are absent from the reports.

Syphilis is still prevalent in the navy, and to a very marked degree in comparison with the navies of other Powers, and although the amount of primary syphilis of late years has shown a diminution (partly on account of cases not having been placed on the sick-list, although under treatment), the ratio for the secondary form of the disease has exhibited an upward tendency.

STATISTICS

It has been previously stated that the Statistical Reports on the Health of the Navy, in their present reliable form, commence with the year 1856, the fragmentary returns before this date being of little use. In the diagrams representing the annual ratio per 1,000 of force of cases of syphilis, which have been constructed for each station, the black line represents the ratio for primary and secondary syphilis combined, the interrupted line that for primary, and the dotted line that for secondary. These diagrams have been drawn up from the data given in the reports from 1856 to present date. They show at a glance the various oscillations of the

disease, and are particularly interesting during the period of the operation of the Contagious Diseases Acts.

Ratios, when not otherwise stated, always to read per thousand of force.

CLASSIFICATION INTO STATIONS

For administrative purposes the ships of the Royal Navy are classed as being employed on various stations, and it has been considered wise to adhere to such a plan in describing the effects of syphilis in the fleet. For each of these stations separate statistical returns are prepared, the aggregate forming that for the total force. These several stations are :—

1. Home Station.
2. Mediterranean Station.
3. North America and West Indies Station.
4. South-east Coast of America Station.
5. Pacific Station.
6. Cape of Good Hope and West Coast of Africa Station.
7. East Indies Station.
8. China Station.
9. Australia Station.

In addition to the former the ships employed irregularly or on special duties have been termed—

10. The Irregular Force.

The limits of the stations have often been altered, and this has considerably affected the returns, but the changes will be mentioned when the respective stations are being discussed. As the result of the reorganization of the fleet in 1904, further significant alterations occurred which were embodied in the report for 1905 ; the Channel Fleet, which had been previously taken with the Home Station, appears separately, and a new station, the Atlantic, was created. The South Atlantic (old South-east Coast of America Station) and Pacific Stations were abolished. Also the Particular Service Squadron was added to the North America and West Indies Station.

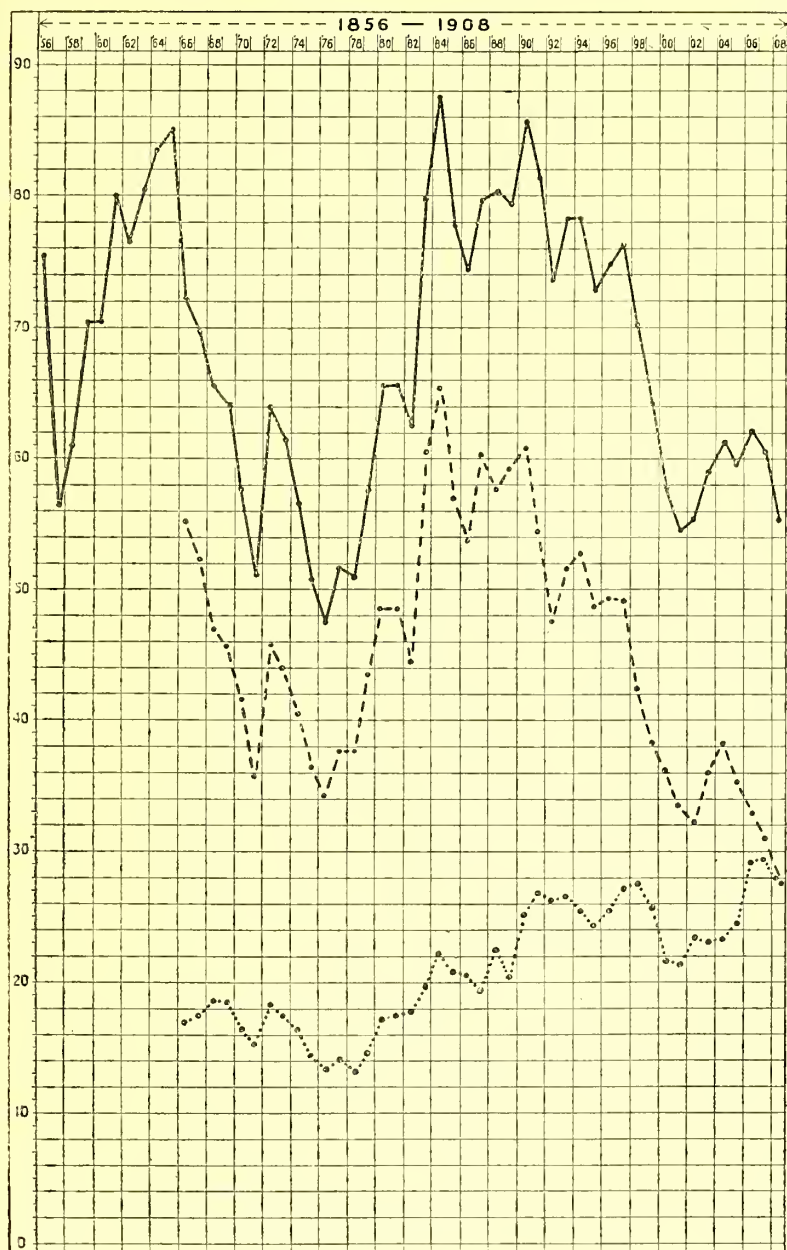


FIG. 15. Curve showing incidence of syphilis, primary and secondary, in the total force of the Royal Navy, from 1856 to 1908.

TOTAL FORCE

In 1856 the mean force was 51,730; in 1908 it was 109,210, more than double.

The ratios show frequent vacillations; taking periods of ten years, from 1856 to 1865, the average was 74.4 per 1,000; no distinction is made between primary and secondary syphilis, and the sick per mille daily were 7.7. From 1866 to 1875, the ratio for primary syphilis was 44.29 per mille, and that for secondary 16.9, being a total of 61.2, showing a reduction of 13.2 on the previous period of ten years, and the sick per mille daily were 6.3. The reduction in the ratio for this period shows the beneficial effect which the working of the Contagious Diseases Acts had (they were in force since 1866), and thus a comparison between the two periods can be made, during the first of which no legislative measures were enacted. From 1876 to 1885 the ratio shows an almost continuous rise, the average for the period being 47.59 for primary and 16.96 for secondary, the combined ratio being 64.55, showing an increase of 3.3 per cent. over the primary ratio of the preceding ten years, and the small increase of 0.06 per cent. in the secondary. The sick per mille daily were 5.99.

The cause of this increase in ratios was the greater prevalence of disease towards the end of the period, especially in 1883 and 1884, when the ratios for primary syphilis were 60.53 and 65.32 respectively, no doubt due to the cessation of the operation of the Contagious Diseases Acts.

For the period 1886 to 1895, the primary ratio was 54.57, and that for secondary 24.29; both show an increase over those for the preceding ten years of 6.98 and 7.33 respectively. The Acts were repealed in 1886. The sick daily per mille were 7.42, an increase of 1.43 per mille.

From 1896 to 1908 there has been a decline in the ratio, which was 35.91 for primary and 25.35 for secondary. The sick daily per mille were 5.42. The reduction in the ratio for primary syphilis is 18.66, and in the sick daily 2, but there is an increased ratio of 1.06 for secondary. Since 1901 there has been a progressive rise in the ratio for secondary syphilis.

In 1905, for the first time in the Statistical Reports, a distinction between primary syphilis and chancroid occurred. Hitherto both were classified as primary syphilis, and now a comparison can be made for four years, 1905, 1906, 1907, and 1908.

1905. Chancroid,	1,174	cases =	10.57	per mille.
Primary syphilis,	2,729	„ =	24.58	„
1906. Chancroid,	1,672	„ =	15.45	„
Primary syphilis,	1,888	„ =	17.45	„
1907. Chancroid,	1,905	„ =	17.51	„
Primary syphilis,	1,461	„ =	13.43	„
1908. Chancroid,	1,952	„ =	17.87	„
Primary syphilis,	1,037	„ =	9.49	„

It will be noticed that the ratio for chancroid annually increases, and that for primary syphilis shows a progressive diminution; this may be due partly to the more accurate diagnosis, but also, it must be said, to the fact that several cases of the latter have not been noted in the statistics from some ships, so that in reality the figure is too low. It is unfortunate that the distinction between syphilis and chancroid was not effected earlier.

Tabulating the average ratios for each period the following results are obtained:—

1856 to 1865.	Average ratio	74.4	(combined).
1866 to 1875.	„	44.29	for primary syphilis.
1876 to 1885.	„	47.59	„
1886 to 1895.	„	54.57	„
1896 to 1908.	„	35.91	„

Or dividing into three periods, (i) before the operation of the Contagious Diseases Acts, (ii) during their operation, and (iii) after the repeal of the Acts:—

(i) 1856 to 1865.	Combined ratio	74.4	per mille.
(ii) 1866 to 1885.	„	62.83	„ { 45.89 primary.
			„ { 16.94 secondary.
(iii) 1886 to 1908.	„	66.61	„ { 41.59 primary.
			„ { 25.02 secondary.

From the foregoing figures it is evident that the Acts had a decidedly beneficial effect upon the ratio; since the abolition the improvement has not been so maintained.

CHAPTER XXVI

SYPHILIS IN THE HOME STATIONS

THE force on this station includes all vessels employed in home waters, and the various establishments ashore. The statistics of the Channel and Atlantic fleets have been incorporated with those for this station, although these fleets with their accompanying cruiser squadrons spend some of their time away from home. In 1856 there were 58 vessels in commission with a force corrected for time of 12,445, and in 1908, including the Channel and Atlantic fleets, but exclusive of torpedo boats, destroyers, and submarines, there were over 200 vessels and the total mean force amounted to 82,460.

In 1856 the ratio for combined primary and secondary syphilis was 88·14, and in 1908 it was 56·63, a difference of 31·51 (Fig. 16).

On going back to 1837 we find that the ratio was 34·8, and this was increased to 53·7 for 1843, the average ratio for the seven years being 46·1. During this period it is remarkable that cases of syphilis were more numerous than those of gonorrhoea, the totals for the seven years being 1,456 cases of syphilis and 1,010 cases of gonorrhoea. Apparently there was a considerable improvement as regards syphilis, for in the reports ('Health of Navy,' 1837) it is stated :—

Syphilitic diseases were not so numerous by nearly one-half during the previous seven years, 1830 to 1836; from this it might be assumed that the disease is becoming both less common and less severe than it was formerly amongst the more degraded classes of society.

After 1843 there must have been a very large amount of syphilis in the Home Stations, since in the report for 1856 (there are no available returns between 1843 and 1856) we read :—

It is to be regretted that as compared with former years there is a large increase in the ratio of cases of venereal disease. For instance, the average number of cases occurring annually for fourteen years in 1,000 of mean force did not exceed 74, whereas for the present year it is 88·14. . . . It is a fact which deserves

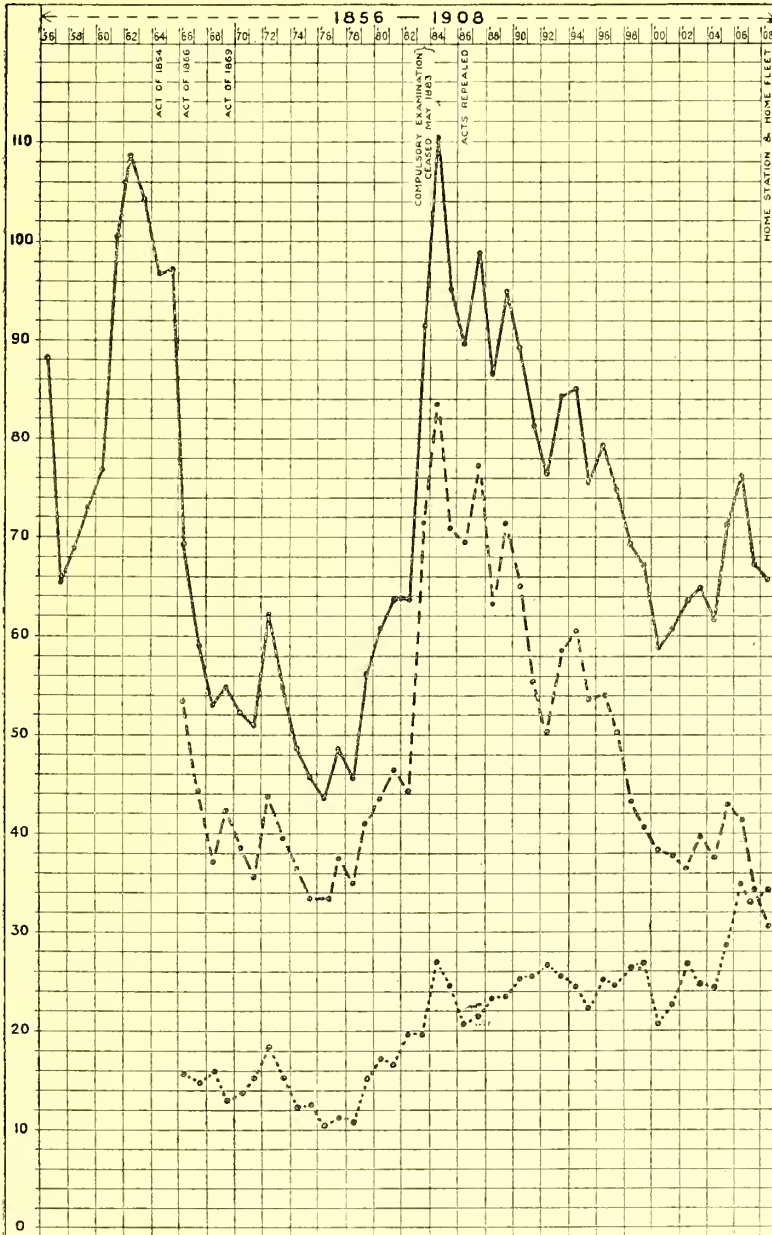


FIG. 16. Curve showing incidence of syphilis in home stations from 1856 to 1903.

to be more generally known, that syphilitic diseases are more prevalent in this country, especially in the garrison and great seaport towns, than they are in any other part of the known world. This stigma on our national character is well deserving the attention of those who urge on the charitable public the necessity of expending large sums annually on distant savage tribes, for until we ourselves are more free from vice and pollution it will be in vain that we attempt to inculcate, either by precept or example, the necessity of other nations adopting a purer and better mode of life.

During the Russian War of 1854-5, the vessels of the Baltic Fleet had frequent communication with home ports, and the ratio of syphilis was 41·7 per mille (double that for the Black Sea Fleet, which was 20·6 per mille). The reports for the years 1854 and 1855 state that the cases were nearly all contracted in the home ports, where the men had almost unlimited liberty during the winter months. 'When it is understood that it is not unusual in garrison towns for the admissions into hospital to be in the ratio of one syphilitic case to two or three of every other case of disease and injury,* as the men seldom landed at any of the large towns on the shores of the Baltic, it necessarily follows that nearly the whole of the cases were contracted in England.' The question was raised at this time of the suitability, or rather necessity, of erecting Lock hospitals in large towns, especially seaport and garrison towns.

The consideration of syphilis in the Home Stations after 1856 may be conveniently divided into three periods:—

1. 1856 to 1865. Before legislative measures were introduced.
2. 1866 to 1885. During which time the Contagious Diseases Acts were in force.
3. 1886 to 1908. After the abolition of the Acts; no preventive measures in force.

I. FIRST PERIOD, 1856 TO 1865

The average ratio for this period was 90·17; no distinction between primary and secondary syphilis was made in the reports.

* The statements made in the foregoing quotations regarding the contraction of 'syphilitic disease anew' and its 'communication without the intervention of primary disease' are decidedly contrary to modern views! The extracts tend to show the chaos that existed at the period concerning the correct definition of syphilis.—E. P. M.

In 1856 the ratio was 88·14, in 1857 it fell to 65·7, the explanation for the decrease being ascribed to the fact that the newly raised men had acquired more staid and regular habits than prevailed during the late war, and that many worthless characters had been discharged. Syphilis was especially virulent at Sheerness, and also at Plymouth, Portsmouth, and Hull. The Scotch and Irish ports appear to have been tolerably free from the disease. In the 'Health of the Navy' for 1859 it is reported:—

The contrast between vessels anchored at Plymouth, Portsmouth, and Sheerness, and those stationed or touching occasionally at other ports in the United Kingdom, is very remarkable; for instance, in the *Blenheim*, a coastguard ship which lay moored in Portland Roads, there were in a crew of about 270 men only 7 cases of syphilis, and these occurred early in the year; for from the 1st of April until the end of December there was not another case entered on the sick list. This, compared with the number of cases (41) which occurred in the *Cornwallis*, a ship of the same kind anchored in the Humber, shows how much more common the disease is in the one port than in the other. But a more remarkable instance still of the absence of the malady occurred in the *Edinburgh*, which was also employed in the coastguard service at Queensferry in the Firth of Forth; in this vessel, with a crew of 445 men, there was only one case of syphilis during the entire year; but in the *Hogue* at Greenock there were 14 cases in a crew of 370 men.

In 1860 three-fourths of the total number of cases (1804) were ascribed to Portsmouth, Devonport, and Sheerness, and it is stated in the reports for this year that 'ships fitting out for service on foreign stations departed with an almost incredible amount of syphilis among their crews, disease more often than not concealed, so that the sufferer should not be deprived of his leave on shore'. In 1862 the average ratio was 108·6, and the sick daily per thousand 10·2. To convey some idea of the extent to which syphilis prevailed at this time at the home ports the remarks of the surgeon of the *Warrior* may be quoted ('Health of Navy,' 1862):—

A not uncommon history of such cases is, that a man sent cured from hospital to a guardship to await an opportunity of rejoining his own vessel, contracts syphilitic disease anew and returns to his own ship only to undergo another course of treatment. Another man, discharged from one hospital, on his passage to another port presents himself with a recurrence of disease, is sent to a second hospital and there again cured; but before he can pass through the guardship and reach his own, he is again ready for the sick list with secondary, or possibly both primary and secondary symptoms, ending in his being invalided after months of treatment in ships and hospitals.

In 1863 it was noted that there was a great tendency for the chancres to become phagedenic, especially at Sheerness. The medical officer of the *Cumberland* remarks of this port :—

In some of the patients it would appear that constitutional syphilis was communicated without the intervention of primary disease ; at all events, no primary disease was known or acknowledged to have existed. The symptoms were as various as the cases were numerous. . . . Of the cutaneous affections the squamous or scaly diseases were the most numerous. In one case of a papular and scaly character, a peculiar fetid perspiration marked the initial fever. In no other case was this peculiar symptom of constitutional syphilis so well marked, if observed at all ('Health of Navy,' 1863).

The medical officer of the *Edgar*, flagship of the Channel Fleet, reports in 1864 :—

As contrasted with the year 1863, there has been a decided increase (which is, however, more apparent than real in reference to the Channel Station) in the number of admissions for venereal diseases generally, and especially for primary and secondary syphilis, . . . and while the number of men sent to hospital from this cause alone amounts to four-sevenths of the whole number of hospital cases, one-seventh in excess of the number sent for all other diseases together, the loss of service on board has been nearly one-fourth of the total loss for the year.

He gives the following abstract of cases of syphilis occurring on board from July 11, 1862, to December 31, 1864 :—

Total cases of all kinds	428
Number of individuals affected	277
(The difference arising from the same man being repeatedly on the list.)	
Indurated chancres	61
Soft or non-infecting	148
Phagedenic chancres	2
Secondary eruptions, &c.	
Cases following indurated chancre occurring on board	57
Cases following soft chancre occurring on board	10
Secondary cases with no previous history	60

In 1863 the attention of the Government was awakened to the prevalence of venereal disease in the navy and army, and to the necessity of preventive legislation to counteract the daily increasing ravages of syphilis in both services. In 1864 a Contagious Diseases Prevention Act was passed, which provided for the compulsory medical examination of public women and the detention in hospital of those who were found to be diseased. The naval ports that came under this Act were Portsmouth, Plymouth, Woolwich, Chatham, Sheerness, and Queenstown.

The Act was in operation at Portsmouth in December, 1864, and at Plymouth in April, 1865.

In October, 1864, a committee was appointed by the Admiralty and the Secretary for War to inquire into the 'Treatment and Prevention of Venereal Diseases in the Navy and Army'. The report of the committee was issued early in 1866, and refers to 'any practical rules which the committee can suggest to the naval and military authorities to diminish the frequency of the cases of contagion, and which are capable of adoption in the daily life of the ship or barrack'. The Contagious Diseases Prevention Act was found to have been signally successful in several respects; there was very little, if any, opposition to its operation amongst the class of women to whom it was applied, and several witnesses who were examined declared that the Act might be made more general. The recommendations of the committee were the following:—The periodical inspection of all known prostitutes in the garrison towns placed under the provisions of the Act; the appointment of a surgeon for this purpose vested with all necessary powers; punishment for the infringement of the Act; extension of its operation to all garrison and seaport towns in the kingdom where troops or ships of war are stationed; the prohibition of the residence of public women in beer-houses; that the Lock hospitals should be placed under Government control; and that the police supervision of the women in the streets of such towns be more stringent. The committee were of the opinion that a periodical examination of the men might be carried out without offending their sensibilities. They suggested increased facilities for ablution, and the means of improving the moral and physical condition of the men.

Although the foregoing recommendations would greatly tend to reduce the amount of venereal disease in the two services, the committee called serious attention to the fact that its introduction by sailors of the home and foreign merchant services would still remain unaffected by them.

The committee were:—F. C. Skey (Chairman), B. G. Babington, T. Graham Balfour, M.D., Edward Cock, James Donnet, M.D., Richard Quain, Samuel Wilks, M.D., Spencer Smith (Secretary).

In 1865 the ratio was 97·1, a trifling increase over that for 1864; the Act had not got into proper working order. The medical officer of the *Edgar* again remarks ('Health of Navy, 1865') :—

In the past six months of the year, sixty-seven men have been affected with primary syphilis, and of these sixty certainly contracted the disease at Portsmouth. As out of this time six weeks had been spent at sea, it follows that in four months and a half this number of men contracted the disease, . . . being a proportion of nearly thirty per cent. per annum rendered unfit for service by the scourge of our seaport towns. The 67 cases admitted were as follows :—

Indurated chancres	.	.	.	.	.	22
Phagedenic	„	.	.	.	.	1
Soft	„	.	.	.	.	42
Doubtful	„	.	.	.	.	2
						—
						67

One is repeatedly struck with the small amount of gonorrhoea in comparison with syphilis that existed about this period; thus for the year 1865, the total number of cases of syphilis recorded on the home station was 2,039, giving a ratio of 97·1 per mille, whilst the number of cases of gonorrhoea only amounted to 636, which gave a ratio of 30·3. Contrast this with the condition of affairs in any year at the present time; the cases of gonorrhoea equal the total of cases of primary and secondary syphilis—a point which tends to prove the beneficial action of the preventive measures brought into operation.

II. SECOND PERIOD, 1866 TO 1885

During this period legislative measures for the prevention of venereal disease were in force. The Contagious Diseases Prevention Act of 1864, having been found to be inefficient, was amended in 1866 according to the recommendations of the medical committee appointed in October, 1864. This 'Act for the better Prevention of Contagious Diseases at certain Naval and Military Stations' came into force on October 1, 1866; by it the Admiralty or Secretary of State for War were empowered to appoint a visiting surgeon for each of the places mentioned in the Act to carry out the periodical inspections of women under the inspector of hospitals appointed by the Act of 1864, certified

hospitals were to be provided as under the former Act for the reception of women affected with venereal disease; in these hospitals adequate provision was to be made for 'the moral and religious instruction of the women detained therein'. The detention of a diseased person under the Act of 1864 was limited to three months, but under the new Act she could be detained, if not cured, not longer than a further period of three months under the joint certificate of the chief medical officer of the hospital and the inspector of certified hospitals, or the visiting surgeon for the place from which she came; again, if any woman, leaving hospital uncured, and having had notice of the fact given her in writing, was found to be carrying on prostitution, she would be liable to imprisonment. The great feature of the Act of 1866 was the introduction of periodical medical examinations of the women with the view of detecting early disease and thus preventing its spread. The former Act dealt only with women who were known to be diseased, that of 1866 took in all within a radius of five miles of any of the seaports and military stations mentioned in the schedule: Portsmouth, Plymouth and Devonport, Woolwich, Chatham, Sheerness, Aldershot, Windsor, Colchester, Shorncliffe, the Curragh, Cork, and Queenstown. It will be noticed that no Scotch towns are on the list.

In 1867 the Harveian Society appointed a committee to inquire into the question, and the outcome was the formation of an association for the extension of the Contagious Diseases Act of 1866 to the general population.

The operations of the Act of 1866 were extended in 1869, but before the end of this year a popular agitation against the Acts arose, and a motion for their repeal was brought forward in the House of Commons; as a consequence of this fanatical opposition a Royal Commission was appointed in 1870, to inquire into the working of the Acts. The report of this commission was to the effect that the Acts had operated beneficially upon the health of men of both services, but it was recommended that the periodical examination of the women should be discontinued, that the Home Department should be substituted for the Admiralty and the War Department, and that the Act should be extended to parts

of London and to any locality where the authorities required its extension, and which possessed proper hospital accommodation. In 1879 a Select Committee was appointed to investigate the working of the Acts, and after three years' deliberation and inquiry its report was issued. The direct evidence was strongly in favour of the Acts; the diminution of disease in the services was pointed out, also the social improvement of the districts under the Acts dependent on their administration, and the conclusion arrived at was in favour of the maintenance of the Acts.

Notwithstanding this favourable report as to the benefit of the Acts, the House of Commons in 1883 voted the abolition of compulsory examination by 182 votes to 110, which was tantamount to stoppage of the money required to carry on the system, and consequently it was dropped. In 1886 the Acts were repealed.

Such is a brief *résumé* of the legislative measures during this period. The Acts were strikingly successful at the naval stations to which they were applied, and naval medical officers were unanimous in testifying to the diminution of syphilis and also to its milder character. The very women themselves were benefited by them, and less disease was apparent in the unsubjected districts and amongst the community at large.

Another factor must not be lost sight of, which considerably affected the statistics of syphilis in the army, and indirectly had an adverse influence on the navy; this is Lord Cardwell's Order, issued in October, 1873. By this decree the pay of men under treatment for primary syphilis and gonorrhoea was stopped. This led in all military stations, and naval ports associated with them, to considerable concealment of disease, to an apparent but unreal diminution of its prevalence, and also to an apparent and real increase of secondary syphilis, the result of concealed and neglected primary sores. The Order ceased to operate late in 1879. Happily it did not come into force in the navy, but the fact that a number of men suffering with primary sores were at liberty to propagate the disease amongst the class of women consorted with by men of both services must have had a certain influence in spreading infection among bluejackets, stokers, and marines.

Now, turning to statistics; in 1866 primary and secondary

syphilis are returned separately, and the ratio for the former was 53·4, and for the latter 15·7, giving a total of 69·1 against 97·1 for 1865, a reduction of 28 per mille. The Act of 1864 was reported to have had a markedly beneficial influence at several ports, Sheerness, for instance, being stated to be almost free from syphilis; hitherto it had been termed a 'hotbed of disease'. Satisfactory reduction in the ratios continued for 1867 and 1868, the Act of 1866 working successfully, although complaints were made by medical officers that the regulations were carried out very indifferently at Portsmouth, and in 1869 the medical officer of the *Duke of Wellington* stationed at that port writes:—

The increase of disease during the last quarter appeared to depend on some local cause. As regards the arrangements and duties of the police, I believe them to be as efficient as the nature of the Contagious Diseases Act will permit. . . . The rule of assigning two Lock wards to each of the medical officers of the hospital did not appear to conduce to the efficiency or discipline of the establishment ('Health of Navy,' 1869).

The medical officer in charge of the Reserve at Sheerness makes the following observations:—

I may not be wrong in making a few remarks about venereal disease generally as it affects us at this port, and regarding the working of the Contagious Diseases Act at Sheerness.

1. Out of 135 cases of venereal disease which came under treatment during seven months, only 25 were contracted at Sheerness; and I may observe that in 3 cases at least, which were said to have been contracted here and from the same source, there is some reason to believe that they were got elsewhere, as the infecting medium in question, upon being subjected to examination, was found to be healthy.

2. The City of London or its immediate vicinity furnishes nearly one-half of these cases.

3. Few cases comparatively come from the naval ports or garrison towns under the working of the Acts, and very few from the immediate vicinity of this place.

4. The counties of Norfolk and Suffolk furnish the greatest number of cases from districts not under the operation of the Contagious Diseases Acts.

5. From my knowledge of Sheerness in 1857 and the two subsequent years, I conceive that the working of the Acts in question is causing a great diminution of venereal complaints amongst our seamen and marines ('Health of Navy,' 1870).

Hull was noted as being badly infected with syphilis in 1871; the Act did not apply to this port, and there was an influx of foreign merchant seamen who were stated to spread disease. In 1872 an increase in the primary ratio of 8 per mille in comparison

with that for the previous year was explained by the fact that a great number of cases were contracted in unprotected districts. For the succeeding six years a progressive improvement occurred; notwithstanding the outcry against the Acts they continued to do a great amount of good. The opponents brought forward as an objection that gonorrhoea and its sequelae had increased, and so the Acts had utterly failed, but previous to the operation of the Acts this complaint was thought very little of; many cases existed of which no notice was taken, simply because the men, unwilling to be subjected to the restrictions of the sick-list, did not report it, but treated themselves or applied for treatment ashore. When the Act was passed a circular issued by the Admiralty with reference to these affections had the effect of bringing a large number of cases under the observation of the medical officers, which certainly would otherwise never have been seen; this gave rise to the assertion that gonorrhoea had increased as a consequence of the Acts having been established! In 1876 the ratios were the lowest ever recorded both before and after that date, primary syphilis 33·41 and secondary 10·14. Since this date there was a rise in the ratios till 1884, for which year the primary ratio was 83·19, and that for secondary syphilis 26·87, the two combined being 110·06, the highest recorded. As a reason for the increase in the disease was ascribed the limited application of the Acts and the facilities for their evasion. The increase mainly took place in ships at unprotected ports, but there also was a slight increase in those stationed at ports under the Acts. The ratios of increase during the four years 1878 to 1881 on the averages for ten years were as follows:—

<i>Ports under the Acts.</i>		<i>Ports not under the Acts.</i>	
From	39·29 per 1,000 in 1878	From	92·0 per 1,000 in 1878
To	41·84 „ „ 1881	To	102·0 „ „ 1881
Increase 2·55 per 1,000		Increase 10·0 per 1,000	

The operation of the Acts began to be carried out in a very lax manner in 1882, and the persistent agitations of the 'Abolitionists' were at last successful, in so far that in May 1883 compulsory examination was abolished; the change in the administration of the Acts producing a serious increase in the

ratio for syphilis, especially during the latter half of this year, which reached its highest point in 1884. The ratios per 1,000 for primary syphilis, for the first and second halves of 1883, were 52·42 and 93·47 respectively, and those for the similar periods of 1884 were 84·41 and 82·13 ; concerning which there is the following remark in the ' Health of the Navy for 1884 ' :—

It appears, therefore, that while the returns show a large increase in the amount of primary disease during 1884 when compared with the years during which the Contagious Diseases Acts were in force, and even exhibit a larger ratio of primary and secondary syphilis than hitherto recorded in the Reports, and before there was any legislation in this direction, yet so far this increase has not tended to become progressive, but, on the contrary, has showed a tendency in the opposite direction. On the other hand, there were small increases in the time in which each case was under treatment and in the average number per 1,000 sick daily (10·89) ; but when the many accidental circumstances which govern the fluctuations of this disease are taken into account, it becomes quite evident that it is too early to generalize on the subject, and for the present all that can be done is to record facts ; the question, what course these diseases will pursue under the changed conditions of the law, must await solution by time.

In 1885 there was a decrease of 12·33 in the ratio for primary syphilis compared with 1884, but an increase of 24·08 per 1,000 over the average ratio for the past ten years.

The following table shows the number of cases of syphilis (primary and secondary) treated in Haslar Hospital during the first three quarters of each year from 1880 to 1886 :—

	1880	1881	1882	1883	1884	1885	1886
1 Jan. to 31 Mar.	100	105	116	174	325	285	232
1 Apr. to 30 June	120	137	135	166	345	275	250
1 July to 30 Sept.	157	143	112	328	341	365	377
Totals	377	385	363	668	1,011	925	859

These figures show the rapid rise in the amount of the disease after the cessation of the enforcement of the Contagious Diseases Acts, and the subsequent small progressive decline.

The following table, which gives the ratio per 1,000 of cases of syphilis from 1860 to 1882, occurring in ships stationed at ports under the Acts and, for comparison, at ports not under the Acts, has been drawn up to illustrate the beneficent effects of these legislative measures :—

SHIPS AT PORTS UNDER THE ACTS

<i>Period.</i>	<i>Average Annual Complement.</i>	<i>Average Annual No. of Cases.</i>	<i>Ratio per Mille.</i>
No Acts in force 1860-1863	9,050	679	75.02
Act of 1864 in force 1864-1865	10,010	792	79.12
Acts of 1866 and 1869 in force	1866-1870 10,340	{ Primary 359 } 488	{ 34.72 } 47.19
	1871-1881 11,160	{ Secondary 129 } { Primary 339 } 467 { Secondary 128 }	{ 12.47 } { 30.37 } 41.84 { 11.46 }

Ports of Dartmouth, Portsmouth, Plymouth, Queenstown, Southampton.

SHIPS AT PORTS NOT UNDER THE ACTS

<i>Period.</i>	<i>Average Annual Complement.</i>	<i>Average Annual No. of Cases.</i>	<i>Ratio per Mille.</i>
No Acts in force	1860-1863 1,670	117	70.05
	1864-1865 1,540	154	100.0
	1866-1870 1,640	Primary 97 } 139	59.14 } 84.74
	1871-1881 1,500	Secondary 42 }	25.6 }
		Primary 118 } 153 Secondary 35 }	78.66 } 101.99 23.33 }

Ports of Greenock, Hull, Kingstown, Leith, Liverpool.

The diagram (Fig. 17) shows in a very marked manner the effect of the Acts during this period. The disease not only diminished in prevalency, but it also became of a much milder type, thanks to the habit of cleanliness and various social improvements produced by the operation of the measures; the enforced treatment of infected persons, with the consequent prevention of the spread of disease, was perhaps the chief agent in this diminution.

III. THIRD PERIOD, 1886 TO 1908

In 1886, the year of the Repeal of the Contagious Diseases Acts, the ratio for primary syphilis was 69.35, being 1.51 less than that for the previous year. In 1887 an increase in both ratios took place, and reports were sent in that the disease was prevalent at all of the home ports in a more or less severe degree and form. Since this date there has been a tendency for the primary ratio to fall progressively, but on the other hand, that for secondary syphilis shows a fairly progressive rise which reaches a climax in

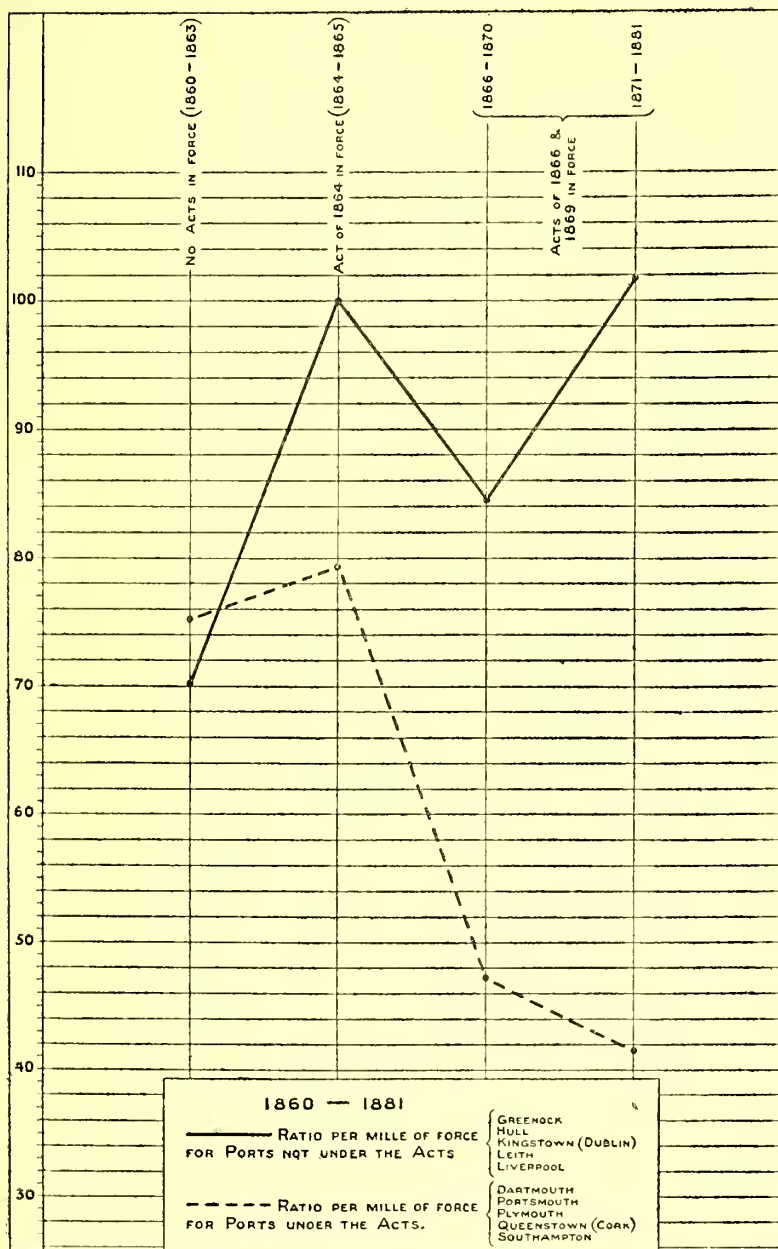


FIG. 17. Ratio per mille of force for ports not under and under Acts, 1860-1881.

1906, 34.81 per 1,000, the highest ever recorded. The average ratio for secondary syphilis for the period 1866 to 1885 was 16.13 per 1,000, whereas from 1886 to 1908 the average ratio has increased to 26.54 per mille. The number of deaths recorded from syphilis during the former twenty years (1866 to 1885) was four, and from 1886 to 1908 there is a total of fifty-one. The average number sick daily per 1,000 of strength is also higher for the latter period.

Notwithstanding the improved social conditions which have been effected since the Repeal of the Contagious Diseases Acts, there is a great amount of syphilis extant at the various home ports; the evil effects of this preventible disease are only too clearly demonstrated by the increase of the secondary form, and the number of fatal cases. The numbers annually invalided from the service on its account also point to its severity still.

The proportion between chancroid and primary syphilis, which distinction was first made in 1905, can now be given for four years, 1905, 1906, 1907, 1908, for the Home Station.

1905.	Chancroid	814 cases,	Primary Syphilis	1,972 =	5 : 12
1906.	„	1,185	„	„	1,428 = 5 : 6
1907.	„	1,321	„	„	1,134 = 11 : 10
1908.	„	1,457	„	„	781 = 9 : 5

Hence, it will be seen that the proportion of chancroid each year to primary syphilis had a progressive increase. From being in 1905 less than half the number of cases of syphilis, in 1908 the proportion is nearly reversed, that is, nearly twice as much chancroid was met with as primary syphilis.

CHAPTER XXVII

SYPHILIS ON THE MEDITERRANEAN STATION

THIS station has always been an important command, and a large force has generally been maintained and augmented or reduced according to political circumstances. After the Crimean War there was a considerable reduction, an increase was effected in 1859, 1860, and 1861, and the force was gradually reduced till 1890, and again annually increased till 1905, when the general redistribution of the fleet took place and several ships were withdrawn. Since June 17, 1884, the Red Sea has been added to this station.

Compared with the Home Station there has been much less syphilis in the force on the Mediterranean Station. During the early period of this review, many, if not the majority, of the cases occurring on the ships were contracted in English ports on fitting out, &c. For the period 1837 to 1843 the average ratio was 33·0 per mille of force (Fig. 18).

During the ten years 1856 to 1865 the average ratio was 48·8. In 1856 it is remarked that there was a considerable increase in the ratio of cases, in comparison with the preceding two years, a large proportion of which were originally contracted in England. Syphilis was reported to be prevalent at Constantinople and also at Gibraltar. In 1859 it is noted in the 'Health of the Navy' (1859) that at Malta there was a temporary suspension of the system of surveillance of public women, which led to a great increase in the amount of venereal disease in the island. This system had been established for probably more than three hundred years, possibly by the Knights of Malta, and during the occupation by the British up to the beginning of 1860 it had been attended with admirable results. Apparently this was not founded on any legal enactment, but was a system fixed by custom; for at the commencement of 1860 the women discovered

that there was no law compelling them to submit to examination and at once took advantage of the fact, refused to be examined, and all surveillance was suspended. Previous to this date Malta had enjoyed an almost entire immunity from venereal disease. The effects of this suspension of surveillance were very speedily seen, and in May 1860 the Deputy Inspector-General of the Royal Naval Hospital called the attention of the Rear-Admiral Superintendent of the dockyard to the 'great increase in the amount of venereal disease received into the hospital, and affecting the seamen and marines of the fleet, nearly all of which has been contracted on this island'. This letter was submitted to the Commander-in-Chief, who at once drew the attention of the local authorities to the subject, and begged that some steps might be taken to stay the disease. After repeated representations the Government passed an 'Ordinance for the prevention of the spreading of Venereal Disease', on May 10, 1861, which was promulgated on June 14. That the measure was necessary may be inferred from the fact that in the general visitation which followed on the passing of the law, fifty-six prostitutes out of a total of 145 had to be sent to hospital. The good results which followed the reinstitution of the surveillance are described in a letter from the Deputy Inspector-General :—

I have now the great satisfaction of stating that, owing to the admirable manner in which the law has been enforced by the local Government in regard to this question, from the period of its promulgation, now nearly four months ago, there has not been a single case of venereal disease received into this hospital that was contracted on this island, a result that has far exceeded my best expectations. I beg further to state that, previous to the establishment of this law, the number of venereal cases contracted at Malta and under treatment in this hospital was, at the lowest computation, forty men per day, to say nothing of the numbers which were rendered unfit for duty on board the respective ships composing this great fleet ('Health of Navy,' 1862).

At Corfu a similar system was rigidly carried out, entirely through the police, and venereal disease was almost unknown; an occasional outbreak would occur after arrival of a regiment from England or Gibraltar, where the preventive measures, if carried out at all, were apparently not very rigorous at this time. The surgeon of the *Neptune* remarks, in 1862 :—

Owing to a strict medical surveillance at Malta and Corfu, venereal affections are scarcely ever met with at either of these places; but though a similar system

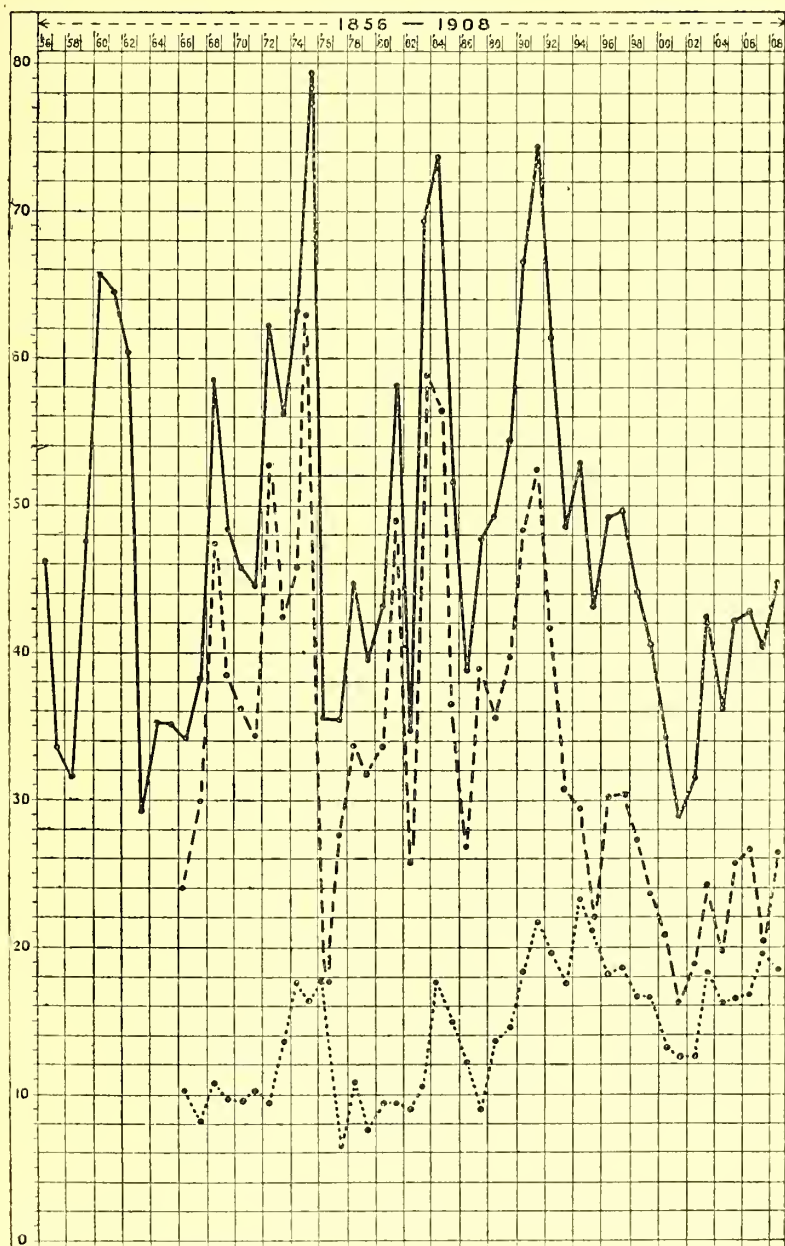


FIG. 18. Incidence of syphilis on the Mediterranean Station, 1856-1908.

is nominally in existence at Naples, our men suffered severely there both from syphilis and gonorrhoea, and with the exception of the regular sloughing form, every variety of chancre was met with ('Health of Navy,' 1862).

Athens too is noted as being a bad spot, and on the transference of the Ionian Islands to Greece in 1864 the medical supervision of the women became very remissly executed, the result being an increase of syphilis. In 1865 representations were made to the authorities at the Piraeus by naval officials on the subject of the prevalence of disease there, the ships calling at this port invariably having many cases of syphilis under treatment afterwards.

The average ratio for the next ten years, 1866 to 1875, was 39.61 per 1,000 for primary syphilis, and 11.2 for secondary, or 50.8 for combined forms, which gives the slight increase of 2 per 1,000 on the previous ten years. In 1866 the surgeon of the *Hydra* writes concerning Sicily :—

Syphilis exists in a very bad form in most of the seaport towns of Sicily. . . . In the solitary case which occurred on board, it seemed as if the ancient virulency of the disease amongst the Neapolitans retained its malignant characters in Sicily. The chancre commenced with a hard indurated pustule, without any abrasion of the skin ; in a few days a small ash-coloured spot appeared, which gradually increased in size until it was as large as a sixpence. The ulceration then ceased, leaving a deep unhealthy looking chancre of a pale yellow colour exuding a thin ichorous discharge. The patient's health suffered a good deal, and there was some constitutional irritability. The disease was contracted at Catania, a large mercantile port, and where there is generally a large garrison and consequently venereal diseases largely prevail ('Health of Navy,' 1866).

In 1867 less disease was noted as having been contracted at English ports in ships fitting out for the station ; but a good deal prevailed at Gibraltar. In 1869 the surgeon of the *Endymion* writes of this port :—

A comparatively heavy amount of sickness occurs under this head (syphilis), exceeding that of any like period of the commission. Every case originated at Gibraltar, where there is little or no supervision of prostitution. Fifteen cases were added. It is unfortunate that some measures are not adopted to prevent such a large amount of preventible disease. Whilst Malta is almost free from it, Gibraltar is a perfect hotbed for all sorts of venereal disease. Cadiz, which bears a bad name for venereal disease, did not produce a single case, though many special and privilege leave men were daily on shore ('Health of Navy,' 1869).

Concerning the Spanish ports, it is remarked in 1872 by the medical officer of the *Lord Warden* :—

During the reign of Queen Isabella there were in force laws regulating the

licensing and examination of prostitutes. After the revolution these laws were not enforced ('Health of Navy,' 1892).

Consequently many cases of syphilis were contracted during the visits of ships to these places, especially at Barcelona.

The average ratio for the ten years 1876 to 1885 for primary syphilis was 36·91 per 1,000, a reduction of 2·7 on that for the previous period, and that for secondary was 11·2, identical with the ratio for the past ten years.

A marked reduction occurred in 1876, from 63·0 per 1,000 in 1875 to 17·7 per 1,000 in the ratio for primary syphilis. This is explained by the absence of the fleet from the Spanish ports, it being chiefly employed in eastern waters, and for some months at Besika Bay. This improvement did not, however, continue, for in 1883 the ratio for primary syphilis stood at 58·72 per 1,000, the highest recorded. This year it was noted that Malta, Alexandria and other Egyptian ports, and Trieste were the places affording the greater number of cases. In 1885 the Contagious Diseases Acts were suspended at Gibraltar, with the 'effect of causing an immediate and large increase in the spread of the disease' ('Health of Navy,' 1885). The average ratio for primary syphilis for the period of ten years 1886 to 1895 was 36·13 per 1,000, 0·78 less than for the previous ten years; for secondary it was 18·04, an increase of 6·84. The combined ratio shows an increase of 0·6 per 1,000. At Malta in 1886 an endeavour was made to create some sort of substitute for the abolished Contagious Diseases Acts, in the identification by the patient of the person from whom the disease was contracted, and who was then examined and sent to hospital. At Gibraltar the Acts were abolished in October 1887, and there was noticed to be an increase in 1888 of cases of syphilis in the *Grappler* stationed there. In 1891 there existed a large amount of disease at Malta, and the medical officer of the *Amphion* remarks :—

Several of our men contracted most troublesome primary sores in Malta, followed in two cases by secondary symptoms before the original sores were healed ('Health of Navy,' 1891).

The ports in the Levant also furnished many cases. In 1894 the medical officer of the *Amphion* remarks of Gibraltar :—

The proportion of cases of venereal disease was much greater in the fourth

quarter owing to the ship being most of the time at Gibraltar, where the disease is rife and of a very bad type. The worst cases of syphilis which have occurred during the commission were contracted at Gibraltar. There is no medical supervision (of the prostitutes). In three months, 10 per cent. of this ship's company were diseased ('Health of Navy,' 1894).

For the period 1896 to 1908 the average ratio for primary syphilis on this station was 23·65 per 1,000 of force; for secondary, 16·2. These ratios show considerable reductions on those for the preceding ten years, viz. 12·48 and 1·84 respectively.

Syphilis was reported to be more or less prevalent in all the ports visited, but of not such a severe type as hitherto observed; in 1896 the disease acquired at Port Said was noted as very bad. As the fleet spent more time at Malta than at any other place, the majority of cases that occurred were contracted at that place.

In 1905 chancroid appears separately, and from the statistics the proportion to primary syphilis on this station for this year was 1:1·63; in 1906, 1:0·73; in 1907, 1:0·41; in 1908, 1:0·42. It must be mentioned in this respect that for the past two years, 1907 and 1908, many cases of primary syphilis were not shown, owing to the fact that the men were not placed on the sick-list whilst undergoing treatment. The abolition in 1888 of the official regulation of prostitution in the Italian ports, in connexion with the Repeal of the Contagious Diseases Acts in England, was reported to be the cause of an increase of disease, and in consequence the crews of the ships visiting them suffered to a certain extent. The greater prevalence also of disease at Malta is noticeable of later years, in comparison with the time when it enjoyed an almost complete immunity.

In which connexion the following is of interest :—

ORDINANCE No. IV OF 1861

Preamble. An Ordinance enacted by the Governor of Malta, with the advice and consent of the Council of the Government thereof. For the Prevention of the Spreading of Venereal Disease.

Prostitutes liable to be visited by the Police. Whereas it is expedient to prevent the spreading of venereal diseases, it is hereby enacted and ordained by His Excellency the Governor, with the advice and consent of the Council of the Government, as follows :

Article 1. Any person, being notoriously a prostitute, shall be liable to be visited three times in each month by one of the police physicians, for the purpose of its being ascertained whether such person is affected with venereal disease.

The visit shall be made in a place to be for that purpose appointed by the superintendent of police.

2. The person referred to in the preceding article shall be summoned to appear for the purpose of being visited as aforesaid, by means of an order in writing, signed by the superintendent of police, and stating the time and place in which the visit shall be made. If such person shall refuse to appear at the time and place aforesaid, or if on her appearance she shall refuse to be visited, such person shall be punished with imprisonment for a term not exceeding three months.

How to be summoned.
Punishment for refusal.

3. The punishment provided in the preceding article shall be remitted as soon as the person sentenced shall consent to be visited.

When punishment remitted.

4. If the aforesaid physician shall declare the person visited to be affected with venereal disease, such person shall be kept in custody, and shall on the same day be brought before the court of judicial police, which court, on the aforesaid declaration being confirmed by the physician on oath, shall order such person to be taken to a public hospital, or to any other place which may for that purpose be appointed by the Head of the Government, to be therein kept under medical treatment until cured.

Proceeding if a prostitute is infected with disease.

5. It shall be lawful for the court, at the request of the said person, before giving the order referred to in the preceding article, to appoint two or more physicians for the purpose of ascertaining the existence of disease.

Other physicians may be appointed.

If such other physicians shall confirm the opinion given by the police physicians, who shall have made the visit contemplated in the preceding articles, the aforesaid person shall be sentenced to pay a sum equal to the amount of the fee to which such other physicians are by law entitled.

Costs.

6. The proceedings indicated in Article 4 shall not take place in cases where the aforesaid person shall, upon the declaration of the police physician that she is affected with venereal disease, consent to go to or remain in the hospital, or other place mentioned in the said article, for the purposes therein indicated.

When proceedings may be omitted.

CHAPTER XXVIII

SYPHILIS ON FOREIGN STATIONS

SECTION 1. NORTH AMERICA AND WEST INDIES STATION

DURING the wars of the eighteenth and the commencement of the nineteenth century there was a much larger force employed in these waters, but there are no statistics to show the amount of syphilis on the station in those days. Sir Gilbert Blane, in his 'Observations', makes very scanty mention of venereal disease in the fleet.

From 1830 to 1836 the average ratio was 25·1 per 1,000 of force, and from 1837 to 1843 it rose to 30·4. In 1856 it was 44·5. The average ratio for the period 1856 to 1865 was 40·01. In the early days the disease was principally contracted in English ports, by the crews of vessels fitting out and refitting; thus in 1856 the *Orion* left England with upwards of thirty men with primary syphilis contracted at Devonport. Bermuda was practically free from the disease at this time; there was also less at Halifax than at the English home ports. In 1863 there was a rise of 12·2 per 1,000 in the ratio over that for 1862. Disease at Port Royal, Jamaica, was noted to be very prevalent, and the medical officer of the *Jason* writes :—

Nearly all the disease of the present year was contracted at Jamaica, and mostly in the early part of the year. Kingston might then have competed with any town in the civilized world in the amount of disease it propagated, and some protection, as at Gibraltar and Malta, is urgently called for. There may be great difficulties in the way of introducing some sort of registration at home, but these would be much more easily overcome in the Colonies, especially in the West Indies, where soldiers and sailors are sought after for the money they put into circulation ('Health of Navy,' 1863).

An unprecedentedly large number of cases came under treatment during this year, on board the *Nile*, at Halifax; and in 1864 and 1865 there was an increase in the ratio; most of the disease

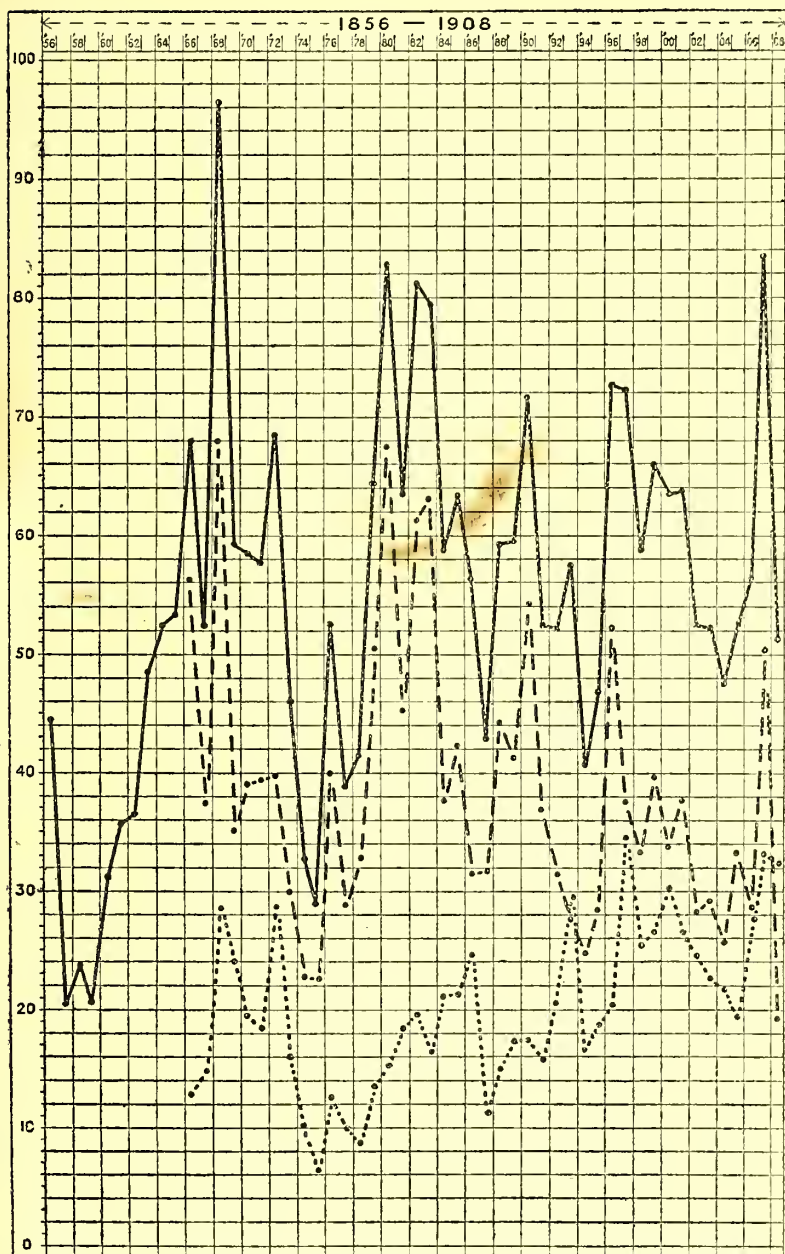


FIG. 19. Incidence of syphilis on the North America and West Indies Station, 1856-1908.

was contracted at Halifax and Jamaica. The surgeon of the *Peterel* writes in 1864 :—

Nearly all the venereal cases (eight of syphilis) were contracted at Port Royal or Kingston. These places, until lately almost free from disease, have now a rapidly augmenting amount, and a bad form of syphilis is commonly met with. When the well-known almost promiscuous relation of the sexes carried on in Port Royal is considered, its future as a hotbed of infection may well be looked forward to with apprehension. With a population entirely dependent on the naval and military, this growing evil might, I think, be checked by legislative means ('Health of Navy,' 1864).

The surgeon of the *Fawn* remarks in 1865 :—

The prevalence of venereal disease, and more especially of secondary syphilis, is to be noted. . . . Four of the cases of primary syphilis (out of twelve in all) occurred in boys, three of whom concealed their complaint for weeks. In all there was extensive induration, and secondary symptoms were appearing on the skin when they presented themselves for treatment. Of the cases of secondary syphilis . . . in five the affection appeared in the form of condyloma and mucous papules about the anus and scrotum. . . . Since the occurrence of so much venereal disease among the boys, leave has not been granted them overnight, and they are now only allowed to go on shore in the daytime, and under the charge of a ship's corporal or other responsible petty officer ('Health of Navy,' 1865).

Until 1863 there was very little disease met with at Port Royal or Kingston; that year steamers with emigrants from New York, bound for Colon, commenced to call for coal at Port Royal, and a bad form of the disease was noticed to be prevalent soon afterwards. At Port Royal the coloured female population were in a majority, and no attempt whatever was made to prevent the spread of disease.

The average ratios for the next ten years, 1866 to 1875, are 41·23 for primary syphilis, and 18·0 for secondary, which give an increase of 19·22 over the combined ratio for the preceding ten years. The increase of syphilis in the West Indies is repeatedly noted by medical officers. The surgeon of the *Constance* writes in 1866 :—

All the cases in 1865 and many of the early cases in 1866 were contracted in England, at Plymouth, which appears to have been at that time worse than the worst of the West Indian Colonies. Jamaica has had a bad reputation for some years, the disease, as at Plymouth, being so often followed by secondary or constitutional syphilis; but it did not prove to this ship so troublesome as at Barbados, where the hard and soft chancre were common, more especially the latter, and both very often followed by constitutional symptoms; scaly, ecthymatous, papular eruptions, &c. Bubo was not so common as at Jamaica, and on more than one occasion was followed by a secondary eruption.

I made several efforts while at Barbados to get the Contagious Diseases Act, or a modification of it to suit the peculiar circumstances of the island, passed by the colonial legislature. The advantages were acknowledged, both by civil and military authorities, but there were obstacles in the way, especially in the shape of a vote of money for a Lock hospital; promises were made, and the subject for the time shelved. From observation in this ship at Barbados, I would say that the chancre contracted there is more commonly soft than hard; but hard or soft it was often of so mild a form that the subject was treated by local means, without being admitted on the sick-list, and not infrequently the first discovery of the disease was a leprous or papular eruption. Towards the end of the year leave was given at the other islands, avoiding Barbados for that purpose as much as possible. This, assisted by the regular examinations a week or eight days after return from leave, helped to check the number and severity of the cases, as well as preventing the spread of the disease to other islands ('Health of Navy,' 1866).

Concerning the disease met with at Port Royal in 1867, the surgeon of the *Constance* remarks:—

Secondary eruptions were as frequent a sequel to it, some of them appearing before the primary sores were healed. In one case the eruption closely resembled confluent small-pox, and in others the secondary eruptions were most severe. The inguinal glands were more frequently affected than at Barbados, and the hard chancre more common than the soft; the disease, in fact, would appear to be of a lower type, i.e. modified by the state of health of the men infected. Repeated examinations were made while leave was being given, and with benefit; but on the 25th October the cases had become so numerous that all further leave was stopped; e.g. on 1st October there were eleven cases on the list, and on the 25th there were twenty-one more ('Health of Navy,' 1867).

The average complement of the *Constance* was 520. In 1868 the ratio was nearly double that for 1867, but for 1869 a reduction of 32·9 per 1,000 was shown against that for the previous year. During the year preventive measures had been adopted at several places, which were strikingly efficacious in bringing about the reduction. The surgeon of the *Jason* notes:—

I am glad to be able to say that a change for the better in this matter is now to be hoped for in Barbados. The working of the Contagious Diseases Act was commenced in the month of November and promises to succeed very well. . . There is an examination every week, and up to the end of December there had been seven. Out of about seventy women examined, eighteen had been detained in the hospital. . . . Trinidad has passed and just commenced to carry out an Act on the same model without any money aid from home ('Health of Navy,' 1869).

Syphilis was reported this year to be more common at Halifax and Quebec. The staff-surgeon of the *Royal Alfred* writes in 1871:—

I have put down in my notes so frequently, when a case has come before me,

'soft chancre without induration,' and in due time have seen that case followed by secondary eruption. In fact, the more I see of the disease on this station, the more I am convinced that it is impossible to predict what cases will or will not be followed by secondary manifestations. . . . A case of syphilis by accidental inoculation occurred in a singular way at Halifax. A man appeared on August 12 with an ulcer on his left cheek of a peculiarly suspicious syphilitic look, with a rupial crust over it, having indurated edges and base, and with the cervical glands on the left side much enlarged. He stated that it was caused by a scratch from a woman in a public-house about a fortnight before; that he never had had syphilis and had no connexion with women on that occasion. He had no sore on the penis. By application of black wash and some mercurial treatment it healed, leaving a large indurated cicatrix. He was discharged to duty on August 30. On September 4 he was readmitted with a syphilitic eruption of psoriasis over the chest and body, and he had general glandular enlargements. . . . I believe this was a case of secondary disease by direct contagion. The hands of the woman who scratched him were probably covered with psoriasis, and some of the epithelial scales charged with the syphilitic virus were left in the wound ('Health of Navy,' 1871).

In 1875 there was the lowest ratio recorded for secondary syphilis, 6·3, and that for primary was only 22·5; the application of the Contagious Diseases Act at Barbados, Jamaica, and other places is given as the reason for this great diminution in the amount of disease.

Referring to the next period of ten years, 1876 to 1885, the average ratio for primary syphilis was 46·7 per 1,000, and that for secondary was 15·55, an increase of 5·47 for primary on that of the previous period, but a fall of 2·45 in that for secondary.

A considerable increase was noted in 1876, put down to the careless way the Act was worked at Barbados that year. The agitation against the Acts in England influenced the West Indies as well, and even at Halifax. In 1877 the staff-surgeon of the *Encounter* writes :—

The disease existing at Barbados last year was so prevalent and of so virulent a type that on returning to the station this year I reported the circumstance to the captain, who forwarded the communication to the Governor, and he investigated the working of the Contagious Diseases Act, which had been very carelessly looked after in the island. More attention was then paid to its operation, with the result of a marked diminution in the virulence and amount of primary syphilis ('Health of Navy,' 1877).

More than one-third of the public women summoned by the police were found to be diseased !

In 1882 the disease was reported to be increasing at Bermuda, and an attempt was about to have been made to mitigate the

evil by legislation, but after the fate of the Contagious Diseases Acts in England, the matter was allowed to drop ; and in 1888 syphilis appears to have been more prevalent everywhere since the abolition of protective measures.

For the ten years 1886 to 1895 the average ratio for primary syphilis was 35·28 per 1,000, a reduction of 11·42 in comparison with the ratio for the preceding period. That for secondary was 18·65, giving an increase of 3·1.

During this period Barbados was stated to be in a very bad state of infection, and in fact the disease was worse in all the islands. Halifax, also, was noted in 1895. That the disease was of a more severe type can be judged from the increasing number of men invalided from the station for syphilis.

For the period 1896 to 1908, the average ratio for primary syphilis was 34·3 per 1,000, and for secondary, 26·4, showing a decrease of 0·98 per 1,000 for primary, but an increase of 7·75 for secondary, compared with the past ten years. In 1898 as many as nineteen men were invalided for secondary syphilis from the station, the disease having become more virulent in the West Indian Islands.

In 1905 a larger force was employed on this station, the Particular Service (or Fourth Cruiser) Squadron being included ; this year chancreoid has a separate heading, and for the four years 1905, 1906, 1907, and 1908, the proportions of this to primary syphilis can be drawn.

1905.	Chancreoid	1	case to	Primary Syphilis,	1·7
1906.	"	1	"	"	0·9
1907.	"	1	"	"	0·56
1908.	"	1	"	"	0·66

On this station wherever sanitary protective laws were in force and properly carried out, a decrease both in the amount and virulence of syphilis took place. That such measures were essential to combat the disease has been amply shown by the opinions of the medical officers that have been quoted, and they are more particularly applicable to such a population as exists in the West Indies ; the coloured element is everywhere met with, and this is most to be feared in the transmission of the disease.

SECTION 2. SOUTH-EAST COAST OF AMERICA STATION

As a separate command this station was formed in 1842, previous to which date, for a couple of years, the Brazil Squadron, as it was then termed, extended its operations to the Cape of Good Hope. The duties of the squadron chiefly consisted in cruising off the land for the purpose of intercepting slave vessels arriving from Africa, and the ports on the station most frequently visited were Pernambuco, Bahia, Rio, Monte Video and Buenos Ayres, and also the Falkland Islands (Fig. 20).

The average ratio per 1,000, for the seven years 1837 to 1843, was 21·7 (this represents the ratio for the Brazil division of the South American Squadron, the other division being the Pacific, the separation into the two divisions having taken place in 1837). In the earliest report (1830), it is stated that syphilis was a comparatively rare and mild disease on the Atlantic side of South America, and as the vessels were mostly employed in cruising about, their crews had few opportunities for contracting the disease. Most of the cases that came under treatment were attributable to English ports when the vessels were fitting out. For the ten years 1856 to 1865 the average ratio was 34·1. Again, very little syphilis was contracted on the station. In 1863 the *Egmont*, stationary ship at Rio, did not have a single case, notwithstanding the fact that the ship's company were allowed leave once a week. There was no Government surveillance of public women at Rio, nor at the ports on the River Plate, except Monte Video.

For the next ten years, 1866 to 1875, the average ratio for primary syphilis was 20·44, and for secondary, 15·36; there being a slight increase, 1·7 per 1,000, on the ratio for the preceding period. In 1866 there were thirty-six cases of primary syphilis returned from this station, of which number one ship, the *Narcissus*, contributed twenty, the result of contagion at Bahia, during general leave. All these twenty cases, with one exception which was phagedenic, presented the form of indurated chancre. The medical officer of this ship writes, in 1867:—

The ship's company have had leave every month and sometimes oftener when practicable, both at Rio and Monte Video, so that I do not think the amount of

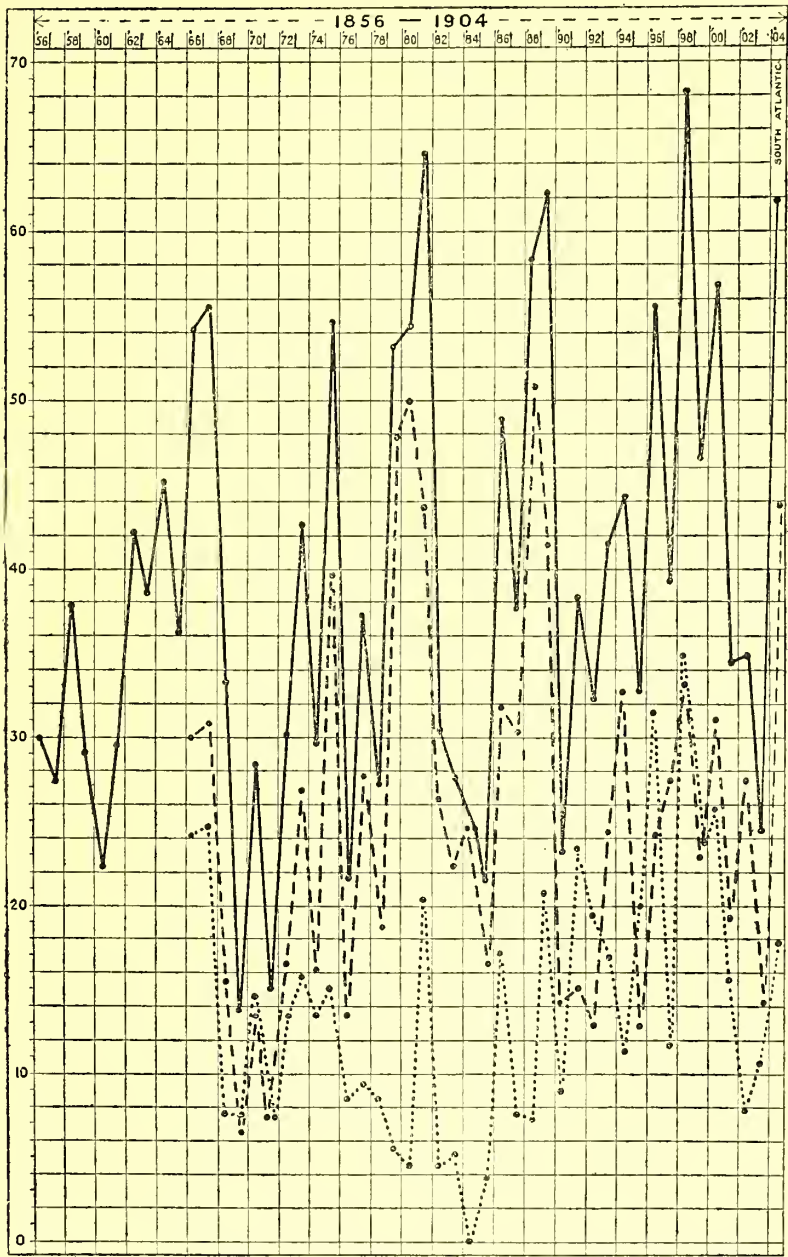


FIG. 20. Curve of incidence of syphilis on the South-east Coast of America Station, 1856-1904.

disease (14 cases of primary syphilis during the year) contracted to be very great. The average duration of each case was about forty days. The sores were mostly superficial and soft, without induration ('Health of Navy,' 1867).

This ship also had the majority of cases recorded in 1868, twelve out of sixteen, all contracted at Bahia, which was stated to be the worst port on the station for the disease. In 1871 only four cases of primary syphilis were recorded on the station, two contracted at Rio, and two at Monte Video. In 1875 there was a greatly increased ratio, being 23·4 per 1,000 higher than for 1874; twenty-one cases were recorded; of these nearly one-half were returned by the *Amethyst*, the medical officer of which ship writes:—

Ten cases of primary syphilis were added during the year. In every instance the disease was contracted at Monte Video, where the ship was stationed for a considerable time, and where general leave was fully given. Six were cases of soft sore. . . . In one case the ulcer had the appearance of a soft sore, but while under treatment a papular eruption appeared over the patient's face, soon extending to the chest, back and extremities. . . . Two of the other three cases were well-marked examples of indurated chancre from the first ('Health of Navy,' 1875).

The average ratio for the next period of ten years, 1876 to 1885, for primary syphilis, was 28·62, an increase of 8·18 over the previous ten years; for secondary, 7·15, a decrease of 8·21.

In 1876 a very considerable decrease in amount of disease was recorded. Only two ships out of the five on the station returned cases of primary syphilis, of which but eight occurred during the year; of these, two only were of the indurated form, and were contracted at Monte Video.

In 1879 there was an increase, compared with 1878, of 29·06 in the primary ratio. Most of the disease was contracted at Rio, and appears to have been of a mild character, as very little secondary syphilis is returned—in fact, in 1884, not one case of secondary syphilis was under treatment during the whole year, and only two were recorded in 1885. Those cases contracted at Monte Video were also not at all severe.

The average ratio for the ten years, 1886 to 1895, was 26·08 for primary, and 15·37 for secondary; a decrease of 2·54 in the primary ratio, but an increase of 8·22 in the secondary, against those for the preceding ten years. The vessels of the squadron

made a longer stay in port than hitherto. In 1893 thirteen cases of primary syphilis were recorded, of which the *Sirius*, the senior officer's ship, reported ten; seven of these were contracted at Rio de Janeiro, two at Monte Video, and one at Maldonado; the remaining three cases were also attributed to Monte Video, and all were of a mild character; there was still a system of police surveillance of women carried out at Monte Video, and soliciting in the streets was prohibited.

The average ratio for the period of eight years, 1896 to 1903, for primary syphilis, was 25·25, and for secondary 20·7. When compared with the ratios for the preceding ten years, the primary is reduced by 0·83 per 1,000, but there is an increase of 5·33 in the secondary ratio. Turning to the diagram it will be observed that the line of secondary ratio is often higher than the primary for the same year. All the cases of secondary syphilis were not due to primary sores contracted on the station; in several instances the original was acquired in England. However, the disease appears to have been fairly prevalent ashore on the station, and the ratios for 1896, 1897, and 1898 show annual progressive increases. In 1900 there was a death, the only one recorded, due to syphilitic meningitis; the primary disease was contracted in England. No cases of syphilis were ever contracted in the Falkland Islands, although the men had plenty of leave on shore when in harbour. In the River Plate syphilis was stated to be very common, yet not many cases were contracted except at Monte Video, Buenos Ayres hardly giving origin to any, but more leave was given at Monte Video than at any other port.

In 1904 the South-east Coast of America Station was abolished, and the South Atlantic formed, having, in addition to the former station, the greater part of the West Coast of Africa, which formerly was part of the Cape of Good Hope Station, included in its limits. The squadron consisted of ten vessels, and the garrison of Ascension Island. The ratios are considerably higher, and no comparison can obviously be made on account of the altered conditions; most of the cases of syphilis were contracted in England. The South Atlantic Station was done away with in 1905.

Compared with other stations, very little syphilis was con-

tracted on the South-east Coast of America Station ; as will be seen from Table XII, page 394, it furnished the lowest ratio, and the disease was of a particularly mild type.

SECTION 3. PACIFIC STATION

Within the limits of this station were the Sandwich Islands, Christmas Island, the Marquesas and Society groups. The duties of the squadron were formerly mostly taken up in cruising, and consequently the ships spent most of their time at sea ; there were no slave vessels to intercept, as on the South-east Coast. The ports mostly visited were Valparaiso and Coquimbo in Chile ; Callao in Peru ; Guayaquil in Ecuador ; Mazatlan in Mexico ; Guaymas, Monterey, and San Francisco ; Honolulu in the Sandwich Islands, and Tahiti in the Society Group. Later on Esquimalt in Vancouver Island, where a dockyard was established.

In the report on the South American Squadron for 1831, it is stated that a large amount of disease was attributable to the Pacific division, and that a striking difference in the frequency as well as the virulency of syphilis was to be noticed on the two sides of South America ; on the Atlantic side being comparatively rare and mild, whereas on the Pacific it was common and often difficult to deal with, occasionally exhibited peculiar features, and offered much resistance to treatment. Otaheite was noted as being the habitat of much disease. The ratio of cases contracted on the Pacific side to those on the Atlantic was about five to two. The average ratio of syphilis on the station for the seven years 1837 to 1843 was 36·4. The ships stationed off the Mexican coast were reported to have suffered most from the disease. Valparaiso is noted in 1838 to have given rise to many cases, but a good deal of syphilis was carried to the station from England in the ships fitting out. In 1843 it is remarked that less syphilis occurred in the Sandwich Islands.

For the ten years 1856 to 1865, the average ratio was 52·03, which is an increase. In 1856 the ratio was 77·2, and of the cases (208) recorded, half were contracted in English seaports, not coming under notice until the ships had left ; the remainder mostly contracted at Valparaiso, where the disease was more

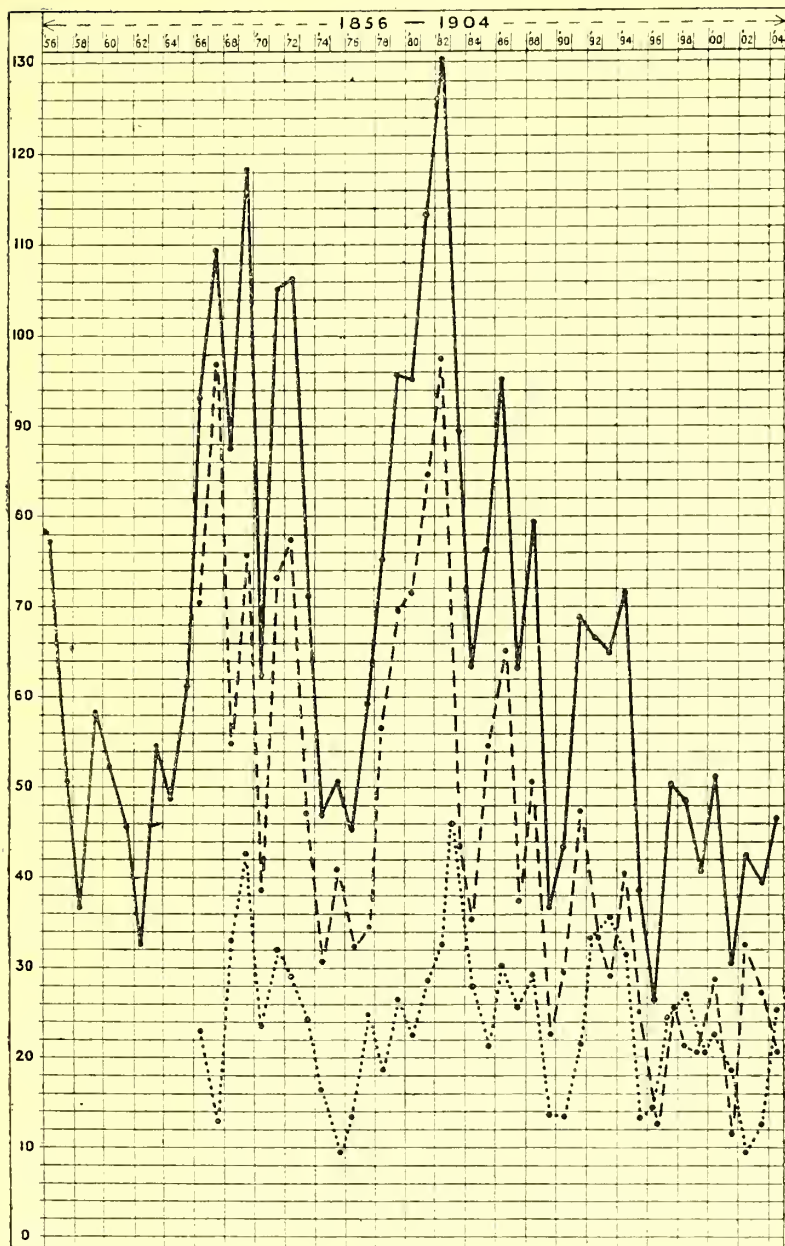


FIG. 21. Incidence of syphilis on the Pacific Station, 1856-1904.

prevalent than at any other port in the Pacific, 'though even less prevalent there than at Portsmouth, Plymouth, and Chatham' ('Health of Navy,' 1856). . . . 'The sores presented symptoms of great virulence, and in some cases the chancres assumed a sloughing appearance.' In 1859 a number of cases were to be traced to communication with Esquimalt, Vancouver Island; it was by no means improbable that the disease was largely imported there from Valparaiso; also this year it was remarked that syphilis was becoming more prevalent in the islands, particularly at Honolulu, yet by far the greater amount was contracted at Valparaiso. The medical officer of the *Calypso* writes :—

In 1858 we lay at anchor in Honolulu harbour for three months, the men had almost unlimited night leave on shore, and as it was the winter season, when the port is frequented by a large number of whalers, the town abounded with native prostitutes, who at that time made it their practice to migrate to that port from all the other islands of the Sandwich group and to remain until the departure of the whaleships to their cruising grounds in the spring. No legislative enactments were then in force for the prevention of syphilis, and out of 153 men and officers, 33 were put on the list for venereal diseases, of which 19 were syphilis. The effects of the disease were visible throughout the islands; the population was rapidly diminishing, sterility was common among the native women, in the families the children were generally few and stunted, and too many of them with constitutional syphilis visibly impressed on their persons. About eighteen months afterwards, with the same crew and in the same ship, I visited Tahiti, where the ship was hove down and remained three months, during which time the men lived on shore in tents or storehouses. We sailed then for Valparaiso, but had only four cases of venereal disease, of which one was syphilis. The French had enforced a system of inspection and compulsory cure and detention of prostitutes, so that had it not been for the occasional importation of the disease in whale-ships, syphilis would have disappeared from the island. The population was on the increase, and the children of the natives were numerous and healthy. Can there be a more convincing proof of the wisdom and beneficence of legislative enactments for the prevention of this disease? ('Health of Navy,' 1859).

The law mentioned was also instituted at Honolulu, in 1860; its provisions required the registration of the women and appointed a medical officer to examine them periodically.

In 1860, out of a total number of 182 cases, 150 were contracted at Esquimalt, but it was remarked that the natives, with the exception of those directly employed in or about the colony, were comparatively free from syphilis. Again in 1861 this settlement furnished the majority of the cases returned from the station. With regard to syphilis in Mexico the surgeon of the *Tartar* remarks in 1863 :—

Many cases occurred among the crew at Mazatlan, where they were often on leave, two or three of which assumed an unhealthy sloughing character. After many representations on the subject, the local Government have wisely taken the matter in hand and have begun to legislate. They have established a Lock hospital for women and a medical police who have the power of enforcing bi-monthly examinations. It is to be hoped that other districts in Mexico will follow the same proper course, and that their authority and instructions may be properly acted up to and carried out, so that the spread of this scourge, syphilis, may be checked. The amount of secondary syphilitic affections that prevail in Mexico is almost incredible, resulting in most cases from the primary disease having been improperly treated and the syphilitic taint being transmitted as an heirloom ('Health of Navy,' 1863).

Fourteen cases of syphilis were invalided this year from the station, or 4.3 per 1,000 of force, a very high ratio. In 1864 the surgeon of the *Sutlej* writes :—

Venereal complaints were again by far the most common ; at least the greatest loss of service resulted from these disorders. Under the heads Syphilis, Gonorrhoea, and Orchitis, there occurred 1,513 days' sickness, nearly one-fourth of all the sickness for the year ; but even that did not comprehend all the mischief caused by the venereal virus, for several other diseases, such as phthisis, rheumatism, and glandular swellings, were excited, protracted, or complicated by syphilis. . . . I am persuaded that it would not be too much to assert that one-third of the loss of service from all complaints during the year was due, directly or indirectly, to the syphilitic virus. Unfortunately the poison is not confined to one locality . . . whether amidst the bustle of commerce in Valparaiso, the seductive indolence of Tahitian sensuality, or the semi-nude savages inhabiting the primeval forests of Vancouver, the loathsome disease is propagated with the same sad uniformity ('Health of Navy,' 1864).

No preventive measures were in force at this time at Valparaiso. Callao seems to have been tolerably free from the disease, and it was also uncommon at Lima. Concerning Honolulu, in 1865, the surgeon of the *Clio* observes :—

During a stay of twenty-seven days at Honolulu, where a registration of prostitutes has within the last year or two been enforced, though privileged and general leave was freely given, one mild case of gonorrhoea was the only bad result that ensued ; while previous to this enactment a Russian man-of-war sailed from the same port with seventy cases of venereal disease ('Health of Navy,' 1865).

For the next ten years, 1866 to 1875, the ratio for primary syphilis was 62.76 per 1,000, and for secondary 24.96, a great increase on the ratio for the preceding ten years. During the period most of the disease on the station was contracted at Valparaiso.

In 1866 it was reported, on the authority of a German medical practitioner in Valparaiso, 'that more than 75 per cent. of the

natives suffer from syphilis in some form or other, inherited or acquired' ('Health of Navy,' 1866). In 1868 representations were made to the Chilian Government at Valparaiso, to the effect that some regulations should be enforced, but considerable opposition was offered by the clergy, and the subject was dropped. Concerning the type of disease met with at this port, the medical officer of the *Zealous* remarks in 1869 ('Health of Navy,' 1869):—

The disease appears to be very severe, and I have noticed that if caught from Spaniards and Portuguese and their half-breeds it is generally much more severe than when contracted from other sources, and usually more difficult to be eradicated from the system. The number of cases that occurred after leave was given at Valparaiso was very great, and no advice appeared to have any effect in checking the men from exposing themselves to the chance of contagion. . . . Syphilis appears to be very virulent when propagated from the Spanish half-breed to the English sailor. Many of the chancres were exceedingly severe and soon followed by secondary symptoms, and these also were of considerable urgency. The character of the chancres differed much; almost every variety of primary chancre was seen, and the after-effects were as various as the first affections. . . . Pustular and papular eruptions were the most general, but it was not possible to decide what would produce secondary symptoms and what would not. . . . Secondary symptoms showed themselves more often in those who contracted disease at Valparaiso than from any other source.

In treating themselves for secondary syphilis, the natives of Vancouver Island were stated to employ an oil obtained from the *Thaleichthys pacificus*, one of the Salmonidae, and which they called 'Houlican', 'Ulican', or 'Oolachan'. It resembled cod-liver oil, and contained iodine, and was very often used in the treatment of syphilitic cases on board ship, by the medical officers, with good results.

In 1871 the ratio for primary syphilis was 73·1 per 1,000, and the medical officer of the *Scout* makes the following interesting remarks:—

I should say that Valparaiso is certainly worse than Yokohama was before the Contagious Diseases Act was enforced there. I cannot say that I have ever found a place so bad. In fact it is little better than a pest-house. I do not remember in my former experience of Valparaiso that syphilis was so rife as we found it there lately. During my first commission in the Pacific I was at Valparaiso four times for periods varying from one to three months, and of course several cases of venereal disease occurred among the ship's company. The disease, I am persuaded, could not have been so widespread and of such intensity as we lately found it ('Health of Navy,' 1871).

And the medical officer of the stationary ship there, the *Nereus*, notes in 1872 :—

The worst forms of sloughing and phagedenic sores are commonly met with, and the great majority, even of sloughing sores, are followed by an inveterate train of after-symptoms. It has occurred to me while in charge of the sick quarters to encounter many forms of the disease, and some realize the old descriptions of *Black Lion*, and that without anything in the constitution of the patient to account for the obstinate sloughing and phagedaena witnessed. There is no registration nor examination of the prostitutes ; ecclesiastical scruples stand in the way of any such examination being practised.

In 1873 the *Scout* was three months at Honolulu, and no case of syphilis was contracted, such was the beneficial result of a Contagious Diseases Act.

For the next period of ten years, 1876 to 1885, the average ratio for primary syphilis was 58·54 per 1,000, and for secondary 26·06, a slight decrease of 4·22 in primary on that of the preceding ten years, but an increase of 1·1 in the secondary ratio.

For six years, up to and including 1882, there was a progressive annual increase in the primary ratio, which reached 97·38 per 1,000. Syphilis was noted to be generally prevalent in all the ports on the station, except Honolulu (where the Act was in force), and especially so along the South Pacific coast. In 1882, at Coquimbo, an attempt was made to enforce some preventive measures with a somewhat good result, but the improvement was not long maintained, for in 1885, out of twenty-seven cases of syphilis in the *Swiftsure*, twenty-three were contracted at that port.

The average ratio for primary syphilis for the ten years 1886 to 1895 was 37·66 per 1,000, and for secondary 24·67 ; both show decreases in comparison with the preceding ten years of 20·88 and 1·39 respectively, the latter not showing much change, which points to the continued severity of the type of disease. Coquimbo was reported to be much worse for infection than heretofore. In 1894 the medical officer of the *Royal Arthur* (which returned thirty-one cases out of a total of sixty-five from the station) remarks :—

In the majority of instances the disease was contracted in Peruvian and Chilian ports ; the presence of an epidemic of small-pox at Coquimbo, by preventing the granting of leave, saved the ship's company from a great deal of syphilis.

During a short stay at Valparaiso of seven days, nine cases of primary syphilis were contracted ; whereas between the 19th of May and the 3rd of November but two cases were contracted in the various ports of Vancouver Island and Vancouver itself (' Health of Navy,' 1894).

For the period 1896 to 1904, when the station as a command was abolished, the average ratio for primary syphilis was 22·58 per 1,000 of force, and that for secondary 19·64, both ratios showing substantial reductions on those for the preceding ten years, viz. 15·08 and 5·03 respectively.

The medical officer of the *Impérieuse* observes in 1897 :—

That not a single case of the primary disease should be admitted during the year shows that the ports of Vancouver Island, in which the ship spent most of the time, are exceptionally free from this disease (' Health of Navy,' 1897).

The ports on the southern part of the station, Coquimbo, Callao, and Valparaiso, continued to furnish the majority of the cases. The store-ship *Liffey*, at Coquimbo, was paid off in 1903, and the ships passed most of the year on the northern part of the station, thus diminishing the primary ratio, which in 1904 was 20·93.

In reviewing statistics of this station for the past fifty years, the influence of one particularly infected port, Valparaiso, is continually noted. Undoubtedly from this port disease was transmitted to many places in Chili and Peru, and perhaps even to Vancouver Island, as from the earliest period it was noted to be the source of a very considerable amount of syphilis in the squadron. Mexican ports also furnished a large quota, but were not so much frequented of late years. It is shown how beneficial was the operation of a Contagious Diseases Act at Hawaii, under the French administration ; half-hearted measures appear to have been now and again adopted at Coquimbo, but with little success, as the high range of the secondary ratio proves. One hundred and ninety-five men were invalided from the station for syphilis, and four deaths were recorded. In comparison with other stations, syphilis on the Pacific was very prevalent and virulent.

SECTION 4. CAPE OF GOOD HOPE AND WEST COAST OF AFRICA STATION

The ships employed on the West Coast of Africa were under a distinct command from those on the Cape Station, until 1869, when the two squadrons were united to form a single station ;

from 1864 to 1869 the Cape Squadron was affiliated to the East Indian, forming the Cape of Good Hope and East Indian Station. In 1869 the East Indian became a separate command. In the slave-trade days the vessels were kept almost continuously at sea, cruising near the slave factories, off the mouths of the rivers and in the bights, occasionally proceeding to St. Helena or Ascension for stores and to refit; as a consequence the men had few opportunities of going ashore, and there was very little syphilis contracted on this station; most of it resulted from infection in English ports, but some cases were due to St. Helena.

The average ratio for the period 1837 to 1843 was 33·4 per 1,000; for

(i) the *West Coast of Africa Station* (Fig. 22), and for the period 1856 to 1868 inclusive, it was 24·7. Twenty-nine men were invalided for the disease. In comparison with other stations for the same period, syphilis was of somewhat rare occurrence in this force. Sierra Leone later on afforded cases, especially in 1860, and an increase was noted in 1865, due to more frequent communication with St. Helena.

(ii) As regards the *Cape Station*, during the seven years 1837 to 1843 the average ratio was 27·0 per 1,000. The vessels of this squadron were employed mostly in duties similar to those of the West Coast Squadron, cruising off the principal slave dépôts in the Mozambique Channel, between Delagoa Bay and the equator, occasionally touching for supplies at Mauritius, places in Madagascar, Mozambique, and Quilimane, on the mainland. The head-quarters was Simon's Town, where leave was usually granted. Syphilis was not very common at this time on the station. Mauritius is noted to have been the original source of infection of more cases than other ports.

For the period 1856 to 1863 the average ratio was 31·3 per 1,000.

At Simon's Bay cases of primary syphilis have hitherto been rare. Unfortunately the sores are in most cases connected with induration and invariably followed by secondaries. There have been a few cases of syphilis contracted at Tamatave, but so slight and easily cured as not to require entry on the sick-list. They were all of the soft, suppurating, and non-infecting species. Of these, seven appear in the return (fifteen cases), being cases of inflamed sores,

produced by neglect and want of cleanliness. It is remarkable that constitutional syphilis seems to be unknown, not merely at Tamatave, but up the country and at Antananarivo ('Health of Navy,' 1862).

In 1863 the ratio was 60·0 per 1,000; most of the disease this year was contracted at Cape Town, where it was stated to be more prevalent than of former years. The surgeon of the *Narcissus* remarks that the prevalence of syphilis at the Cape might then be estimated at 54·0 per 1,000 of mean strength, and continues :—

The spread of this loathsome disease in other parts of what is called the Cape Station appears to depend, or, more correctly speaking, to be limited, more by the manners and customs than by the morals of the natives visited by sailors. At Johanna and at Zanzibar on the East Coast the population is Mohammedan and polygamic. Gonorrhoea is nearly universal; secondary syphilis appears to be not uncommon; but for evident reasons venereal diseases are chiefly confined to the inhabitants. At the Seychelles the original colonists were French. Along the coastline of Madagascar decapitations left for a long time a great surplus of the female population and a great scarcity of the male sex. Syphilis is again becoming frequent in those places visited by ships from the Mauritius ('Health of Navy,' 1863).

The medical officer of the *Penguin* writes of Zanzibar :—

Syphilis and gonorrhoea are exceedingly common in this ship after every visit to Zanzibar. As this town is one of the principal commercial places on the East Coast, and sailors from all parts visit it, there is unhappily no lack of prostitution ('Health of Navy,' 1863).

He also speaks of a very severe form of disease that he saw at Zanzibar, in which gangrene rapidly took place.

(iii) *Cape of Good Hope and East Indian Station.* In 1864 the East Indian division of the China Squadron was attached to the Cape Station until 1868.

For the five years 1864 to 1868 the average ratio (for primary and secondary combined) was 69·38 per 1,000, which showed a considerable increase over that for the Cape Station alone.

In 1865 syphilis was reported to be on the increase in Cape Colony, and Simon's Town was noted as being very much infected, 'no sanitary methods being adopted to restrain infected prostitutes from perambulating the town day and night' ('Health of Navy,' 1865). Concerning the Seychelles the surgeon of the *Lyra* writes :—

Venereal disease again figures heavily, more than one-third of the total days' sickness arising from that complaint. Every case (twelve are recorded) was contracted at Seychelles, where the disease appears to be on the increase if we

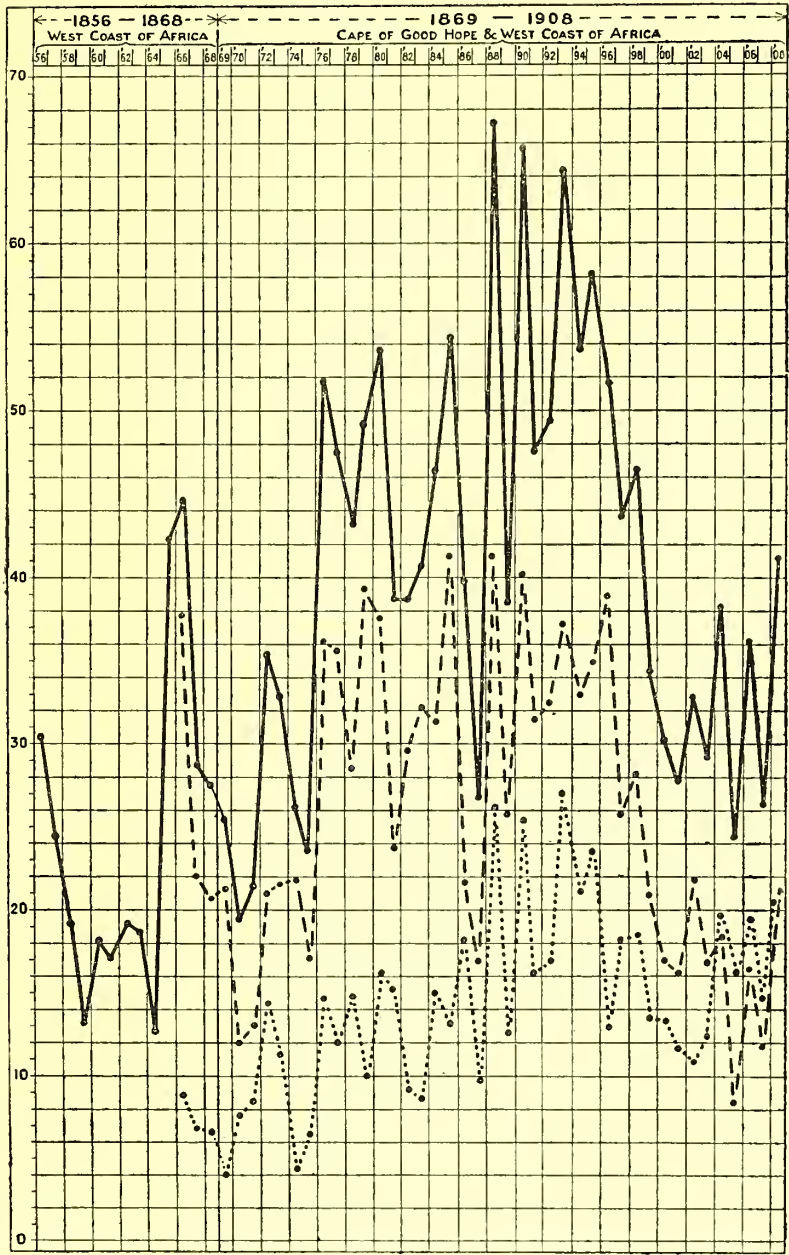


FIG. 22. Incidence of syphilis on the West Coast of Africa Station, 1856-1908.

may judge from our former experience of the islands. The cases were inclined to be obstinate and secondary symptoms usually presented themselves ('Health of Navy,' 1866).

A fatal case was reported in the *Octavia*. A boy convalescing from small-pox contracted disease at Bombay, and the chancre took on a phagedenic action; his general health being much debilitated at the time, he rapidly succumbed. Syphilis was very prevalent at Bombay, so that in consequence of the number of cases that occurred amongst the ship's company of the *Octavia*, the commodore called upon the surgeon of the ship for a special report on the subject. After leave had been given at this place, sixty-eight cases, fifty-one of which were of a specific character, were reported, and the surgeon represented to the commodore the expediency of moving the authorities at Bombay, Madras, and Calcutta, to enforce the Contagious Diseases Act. In 1868 the *Octavia* landed men with the Naval Brigade in Abyssinia.

It is worthy of note that only two cases of syphilis, both simple and slight, occurred among the five officers and seventy-eight men of this ship that accompanied the army to Magdala, as I have it on unquestionable authority that on the return march as far back as Senafe they had ample opportunities of having intercourse with the women of the country.

Continuing his remarks, the medical officer of the *Octavia* writes:

Syphilis in all its forms is, I understood, very common (at Zanzibar), and is known in Swahili as 'Sekeneko'. It is often very virulent and frequently followed by rupia, condylomata, and other secondary affections—a man contracts the disease and imparts it to one or more of his concubines, or women of his house; he then probably puts himself under some form of treatment, and it may be gets cured, but as the women are never subjected to any treatment, the disease is by them kept up, and thus it is constantly maintained amongst the people; it is well known that syphilis in its varied forms is a common complaint among the highest Arab families, and when once it enters a house or harem it seldom leaves it. Another form, called 'Tego', is said to be very malignant and the result of a 'charm', that is, a man before leaving home for a time subjects his wife or concubine to this charm, so that, if during his absence she prove unfaithful, both she and her paramour become affected with this malignant form of disease, which is said to be impossible to cure ('Health of Navy,' 1868).

(iv) *West Coast of Africa and Cape of Good Hope Station.* After 1869, Madagascar, Seychelles, Zanzibar, and Mauritius were taken from the Cape Station to the East Indian; in 1891 the Mozambique and Zanzibar coasts were again added to the Cape. The average ratio for the first ten years, 1869 to 1878, was 22·49

for primary syphilis, and 10·2 for secondary, which are much lower than those which were recorded when the East Indian Squadron was affiliated to the Cape. The Contagious Diseases Act was carried out very strictly at Cape Town and Simon's Town, and the medical officer of the Naval Hospital and the district surgeon of the latter place report a great reduction in venereal disease, especially syphilis, since the Act was established. In 1870 the medical officer of the *Seringapatam*, stationary ship in Simon's Bay, remarks :—

Two cases of syphilis appear, which is wonderfully little when it is considered during the year we had in all nearly two hundred supernumeraries on board, besides our own ship's company, and also that leave is granted every night. I think it speaks volumes for the way in which the Contagious Diseases Act is carried out in the town. In the absence of a colonial surgeon the working of the Act at present devolves upon the staff-surgeon of the Royal Naval Hospital at Simon's Town, and so effectually and at the same time so unabusedly is it done, that even the very strong party in the Colony who are strongly antagonistic to the Act, and have used every endeavour to have it repealed, are, though loath, obliged to acknowledge that could its application be carried out elsewhere in the same inoffensive manner, it would be 'almost' unobjectionable. However, the general feeling is so strong against it that, although the most conclusive evidence in its favour was given before the committee of inquiry and it was clearly proved a public boon, both medically and morally, I fear the Act will be repealed at the next sitting of Parliament. I should look upon this as a deplorable calamity. Venereal diseases in the most virulent form will rage as they did three years ago ('Health of Navy,' 1870).

In 1872 the Contagious Diseases Act was abolished at the Cape, which action was attended with the anticipated results, and the medical officer of the *Seringapatam* remarks in October of that year :—

The ill effects of the repeal of the Contagious Diseases Act, which took place three months ago, are becoming alarmingly apparent just at present, and syphilis and gonorrhoea, which had really almost ceased to exist in Simon's Town, now rage ('Health of Navy,' 1872).

In 1878 the disease was reported as not only being very common amongst the white population of Cape Colony, but also among the natives.

The average ratio for the next ten years, 1879 to 1888, for primary syphilis was 31·13 per 1,000 of force, an increase of 8·64 over that of the preceding ten years ; for secondary it was 14·1, also an increase of 3·9 per 1,000. During this period most of the

disease was contracted at Cape Town and Simon's Town. The medical officer of the *Boadicea*, flagship, writes in 1884 :—

This disease shows an increase as compared with the two previous years, and the class of cases added have been of an equally troublesome and virulent character as those entered last year ('Health of Navy,' 1884).

At the end of 1888 the Colonial Government put the Contagious Diseases Act into force again at Simon's Town.

For the next period of ten years, 1889 to 1898, the average ratio for primary syphilis was 32·51 per 1,000, and for secondary 19·16; both ratios show an increase, of 1·48 and 5·0 respectively, over those for the preceding ten years. The re-establishment of the Act at Simon's Town was of marked benefit, and very few cases of syphilis were contracted there during this period. At St. Helena, however, and Sierra Leone and Lagos, more disease was prevalent, and in 1890 the surgeon of the *Archer* writes :—

The large percentage of cases of secondary syphilis, occurring in connexion with the often enormously indurated, foul, sloughing, primary sores, shows that the disease is of a virulent type. During our visit to St. Helena last year we did not get a single case of syphilis, but this year it seemed very prevalent. There is no contagious diseases enactment on the island ('Health of Navy,' 1890).

Syphilis was also reported to be of a virulent nature at Zanzibar. No Act was in force at Cape Town, where many cases were contracted. In 1892 Zanzibar was stated to be the worst place on the station for the disease. The medical officer of the *Magpie* remarks about St. Helena in 1894 :—

Out of sixteen cases no less than eight were contracted at St. Helena during a stay of fourteen days, and these were all of a severe form. . . . Under the existing conditions venereal disease is rife; in two or three instances men contracted both syphilis and gonorrhoea ('Health of Navy,' 1894).

During the period 1899 to 1908 the average ratio for primary syphilis was 17·59 per 1,000, which shows a reduction of 14·92 on that for the preceding ten years; the secondary ratio was 14·08, also less by 5·08 per 1,000. On the whole there was less disease reported from the station. The latter end of 1899 and in 1900 Naval Brigades were operating on shore, in conjunction with the land forces in the Boer War, but very few cases of syphilis were contracted by the men on active service. In 1901 Zanzibar was the chief source of disease. The island of Ascension was placed

on the South Atlantic Station in 1903, and in 1904 the larger portion of the West Coast of Africa was added to that station; the men on the Cape Station in 1905 only consisted of four ships' companies, a reduction of over 800 in the force on the station.

Chancroid was first tabulated in 1906, and for the three years up to and including 1908 the proportions to primary syphilis are as follows :—

1906.	Chancroid	8	cases,	Primary	Syphilis	16	=	1 : 2
1907.	"	9	"	"	"	5	=	1 : 0.55
1908.	"	11	"	"	"	13	=	1 : 1.18

The Cape of Good Hope Station may be said to compare favourably with others with regard to syphilis. The highest ratio was recorded in 1885, viz. 41.14. The influence of the East Coast of Africa, especially Zanzibar, was very marked; a comparatively small amount of disease resulted from communication with the West Coast, but St. Helena, from its peculiar position as a port of call for all kinds of vessels, had a bad reputation in this respect before the Suez Canal route to the East was inaugurated. The beneficial effects of preventive measures are again well illustrated in the case of Simon's Town.

One hundred and fifty-eight men were invalided from the station for syphilis between 1869 and 1908, and five deaths from the disease were recorded.

SECTION 5. EAST INDIES STATION

Until 1864 the squadron in the East Indies formed part of the East Indian and China Station; in that year it was attached to the Cape Squadron, and in 1869 was again detached to form a separate command (Fig. 23).

The average ratio for the ten years 1869 to 1878 for primary syphilis was 45.41, and for secondary 14.45.

The disease was fairly prevalent in all ports on the station, but Bombay and Seychelles furnished the majority of cases; concerning the latter islands the medical officer of the *Cossack* writes in 1870 :—

In all the disease was contracted at Mahé, and every one of the cases (fourteen)

exhibited the same kind of chancre, viz. the Hunterian, in a very severe form. The disease first appeared as a black spot, causing severe inflammation and induration of the surrounding tissues, and spreading rapidly until as large as a shilling, when sloughing usually commenced, accompanied with a great deal of swelling. . . . Generally speaking, constitutional syphilis followed before the healing of the ulcer, but it was usually mild in character ('Health of Navy,' 1870).

A Contagious Diseases Act came into law at Bombay on May 1, 1870, but the provisions were not enforced until May 31. There appears to have been great opposition offered to the introduction and operation of this measure, but it acted with great success; there was a reduction in the ratio for 1871 of 52·1 per 1,000, compared with that for the previous year, attributable to the good effects of the Act at Bombay. In deference to the wishes of the Parsees, compulsory examination of the women was discontinued in 1872, with the result that the ratio for 1873 showed an increase of 19·8 over that for the previous year. At Rangoon an Act was introduced in 1871, concerning which the medical officer of the *Briton* remarks in 1875 :—

Of the thirteen cases which came under treatment, twelve contracted the disease at Rangoon and one at Bombay. The Rangoon cases, as a rule, were of considerable severity. Although both the soldiers of the garrison and the ship's company of the *Briton* suffered a good deal from venereal disease during the five months of our stay at Rangoon, there can be no doubt at all of the solid benefits conferred on the place by the action of the Contagious Diseases Act ('Health of Navy,' 1875).

There was a Preventive Act also in force at Aden, and at Calcutta a system of registration, examination, and treatment of women was in operation, but from all accounts it appears to have been easily evaded by them. At Colombo also the Act was enforced, and was reported to work efficiently. The absence of any measures at Bombay was deplored by the medical officers of the squadron, as disease was very prevalent and severe at that port. Zanzibar also, in 1877, was reported to furnish a virulent type, the medical officer of the *London* describing the disease there as being 'of a very severe form, and the primary sore has been in every case I have seen, with one exception, followed by severe secondary affections'.

For the following ten years, 1879 to 1888, the average ratio for primary syphilis was 48·11, and that for secondary 15·55. Both

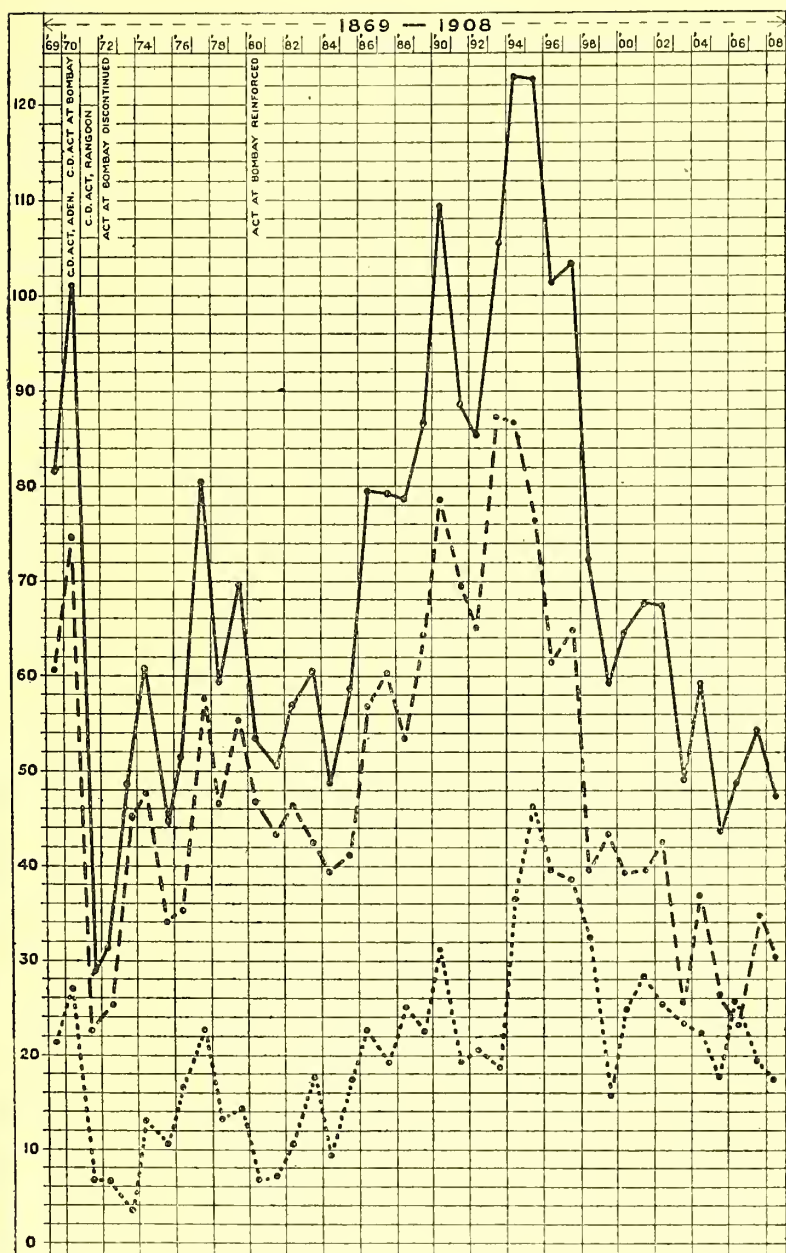


FIG. 23. Incidence of syphilis on the East Indies Station, 1869-1908.

show increases on those for the preceding ten years, of 2·7 and 1·1 respectively.

At Bombay the Contagious Diseases Act was more stringently enforced again in 1880, with the usual beneficial result. Disease was reported to be very prevalent at Mauritius in 1883, where there was no preventive Act in force, due partly to the action of the governor, according to the views of the medical officer of the *Euryalus* ('Health of Navy,' 1884).

The average ratio for the ten years 1889 to 1898 was 69·41 for primary syphilis, and 30·48 for secondary; considerable increases in both are shown compared with those for the foregoing ten years, viz. 21·3 and 14·93 respectively. The principal ports where the disease was contracted were Mauritius, Seychelles, Zanzibar, and Bombay; that acquired at Zanzibar was, as usual, severe. 'In all the cases of disease contracted here the sores were foul, sloughing, and most intractable; I have rarely seen worse forms of venereal disease' (medical officer of *Agamemnon*, 'Health of Navy,' 1889). Fourteen cases of syphilis were invalided in 1889 and seventeen in 1890, all having been contracted on the station. In 1894 the medical officer of the *Marathon* notes: 'Of all the ports we visited during the year, Aden and Trincomalee are almost entirely free from this disease, but Bombay, Calcutta, and Colombo are exceptionally bad.' And the staff-surgeon of the *Brisk* also remarks:—

There will always be a large number of venereal cases in the ships on the East Indian Station, especially at Bombay, Madras, and Calcutta, as the system now in force in India is voluntary attendance at the Lock hospitals. The women, realizing that no one can force them to go, have now consequently given up attending, or probably only go after they have widely spread the disease. The worst cases of syphilis that came under my notice were contracted at Bombay, some of them being of a semi-malignant type ('Health of Navy,' 1894).

The *Marathon* was at Calcutta for one month in 1895, and thirty-three cases of venereal disease were contracted there.

For the ten years 1899 to 1908 the average ratio for primary syphilis was 34·95, and that for secondary 22·18; compared with the corresponding ratios for the preceding ten years these show reductions of 34·46 and 8·3 respectively.

A great improvement is to be noted during this period. The

disease apparently was less prevalent on the station, and from the fewer cases invalided home, its original virulence had, to a great extent, diminished, the average duration of treatment in each case also being 5·3 days less than that for the previous ten years.

Chancroid was distinguished in 1905, and there are four years for comparison between this and primary syphilis :—

1905.	Chancroid	6	cases,	Primary	Syphilis	37	=	1 : 6·16
1906.	"	26	"	"	"	15	=	1 : 0·57
1907.	"	58	"	"	"	7	=	1 : 0·12
1908.	"	36	"	"	"	16	=	1 : 0·44

Compared with other stations, the East Indian shows the prevalence of a large amount of syphilis, the loss of service from the disease being very considerable ; two hundred and eighty-six men were invalided during the past forty years.

SECTION 6. CHINA STATION

Previous to 1840, there was no regular fleet in Chinese waters. A few vessels were occasionally detached from the East Indian Squadron, on a cruise off the coasts of Borneo and other islands of the Eastern Archipelago for the suppression of piracy, or for the relief of stranded trading ships ; but this year, in consequence of the offensive policy of the Chinese Government, nearly the whole force of that squadron was employed in active operations, which resulted in the capture of the Chusan Islands, and occupation of Canton, Shanghai, and other towns. The China Squadron, until 1864, was a division of the East India and China Station, when it became a separate command. The force employed in the East Indian division was a very small one, so that practically there was but little effect on statistics, and, to simplify matters, these will be considered from 1856 to form one station (Fig. 24).

The average ratio for syphilis (primary and secondary, no distinction having been made) for the period of ten years, 1856 to 1865, was 106·5 per 1,000, an exceedingly high one in comparison with corresponding ratios of other stations.

From early reports, syphilis appears to have been very prevalent among the Chinese, yet in the statistical report on the health of the East India and China Station for the years 1837

to 1843, it is stated that there was very little disease among the crews of the ships of the China Squadron, owing to the little intercourse they had with Chinese women, rather than the non-prevalence of the malady. Chinese writers on syphilis state that it was unknown north of the Yangtse Valley till about the middle of the ninth century, when it came from Canton and spread gradually over the empire. It also extended to Japan, and was described to be of a most virulent nature. Perhaps Arab traders conveyed the disease as well as its mercurial antidote (as the Chinese were the first to employ mercury in the treatment of syphilis, its use being synchronous with the advent of the new contagion) from Canton to the West, and it may be that its appearance in Southern Europe, late in the fifteenth century, was due to that agency (D. J. Macgowan, M.D., 'Lancet,' July 28, 1883).

This immunity of the ships' companies did not last long, for in 1856 there were 441 cases of syphilis recorded, giving a ratio of 129.3 per 1,000 of force! (The average ratio for the East India Station for the period 1837 to 1843 was 21.9.) The greater number of these cases were contracted at Hong Kong, where the disease was reported to exist in a more than usually virulent form. At Singapore it was less prevalent and much milder.

In 1859 the *Cambrian* returned fifty cases of primary syphilis, all contracted at Hong Kong, and the surgeon remarks :—

It is lamentable to see the number of seamen whose constitutions year after year are wellnigh ruined in this country by venereal disease; primary sores are almost invariably followed by constitutional symptoms and rheumatism, though every precaution be taken to prevent the contamination of the system ('Health of Navy,' 1859).

The disease appears to have been most detrimental amongst the crews of the gunboats, for nearly a third of the total number (twenty-six) invalided this year were men who had contracted it while serving in these vessels. They had more opportunities of frequenting the shore, and in many of these gunboats there was no medical officer, so the disease was more or less neglected. At Amoy and in the towns and villages on the Min River, and also at Canton, syphilis was reported to be about as prevalent and as virulent as it was at Hong Kong.

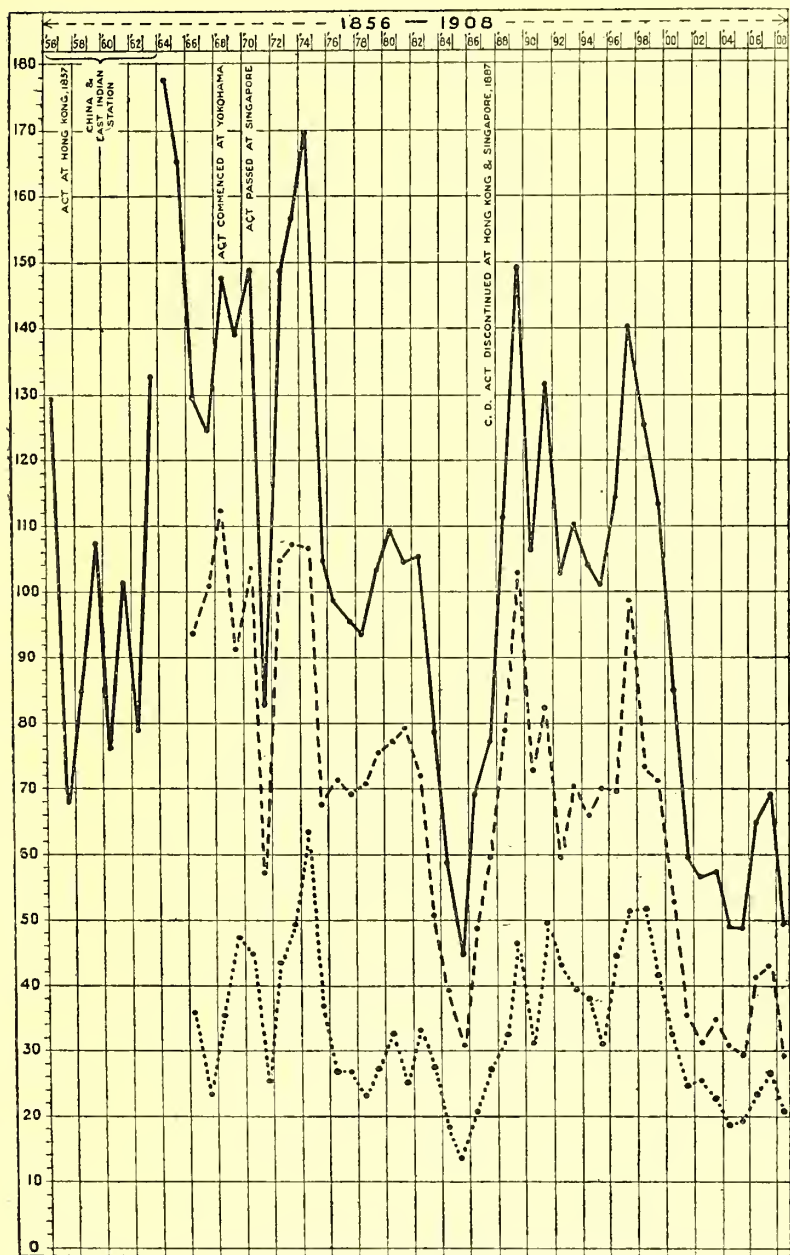


FIG. 24. Incidence of syphilis on the China Station, 1856-1908.

Preventive measures were attempted at Hong Kong in 1857, but were imperfectly carried out, and had but little success owing to the inefficient staff employed. In 1859 the law had become practically inoperative, for the medical officer of the *Chesapeake* remarks, 'At least one-third of the men of this ship who went on shore were infected with the disease in one form or other.' At last it became necessary to bring the matter before the colonial authorities, and regulations of a more stringent nature were adopted, and with success, for a reduction in the number of cases of syphilis soon after took place. It is stated that not less than one-half the total number of cases of syphilis in the squadron in 1860 (649) were referable to Hong Kong, and of the remainder a large proportion was contracted at Shanghai. A few cases appeared among vessels employed in Japanese waters. In 1861 the ships had more communication with the Chinese ports, and also with Yokohama and Nagasaki, which resulted in a higher ratio for syphilis this year. In 1863 the ratio rose to 132·2 per 1,000; most of the disease recorded was contracted in Japan, and the medical officer of the *Euryalus* remarks :—

The most prevalent disease and the most troublesome, at Yokohama at least, is syphilis. I am told that it is chiefly confined to the Treaty Ports. It exists here in its worst form. The chancres are all infecting or constitutional sores. The Japanese doctors thoroughly understand the value of mercury, both internally and locally, in this disease. The number of cases of syphilis contracted at Yokohama has far exceeded the number of cases contracted at Portsmouth and Plymouth whilst fitting out in 1862; whereas very few of the latter cases were followed by secondary syphilis, here there has been scarcely a sore which has not turned out to be an infecting one. In 1862 there were 96 cases of primary syphilis admitted under treatment; in 1863 there have been no less than 158 cases of primary syphilis, all of which, except 29 cases which were contracted at Hong Kong, have originated at Yokohama. . . . We have had under treatment almost every variety of chancre, certainly all those usually described by authors. We have had 'creeping' chancres; 'sloughing' chancres; 'phagedenic' chancres; the old 'Hunterian' chancre, with the cartilaginous button-like base; the 'simple' chancre, with the fretted surface, the abraded surface, mere cracks, and urethral discharges, all of which have been followed by secondary manifestations. . . . We have had no psoriasis, lepra, or rupia; the only cutaneous eruptions that have hitherto appeared are the erythematous and papular, and, in a few cases the pustular ('Health of Navy,' 1863.)

The existence of so much disease at Yokohama, and the consequent infection of so many men, was the occasion of *pourparlers* between

the Commander-in-Chief and the Governor of Kanagawa, for the adoption of some preventive measures; they were, however, futile, and nothing was done. Since the opening of the Treaty Ports in Japan, in 1859, there had been a great advent of foreigners of all nations, particularly at Yokohama, and though the primary disease, when contracted at this port, was of a more amenable character at first, later on it became more virulent and intractable. The Chinese port of Whampoa was described to be 'a filthy place in every respect—prostitutes swarm in the houses, and in the numerous boats on the river, and there is no attempt at supervision or regulation of any kind' ('Health of Navy,' 1863). At Hong Kong also, there was a bad state of affairs, and the surgeon of the *Scout* remarks :—

The sanitary regulations that were for some years enforced with good effect have lately been greatly neglected, and are now, I believe, scarcely attended to in any particular, and venereal disease is rapidly increasing ('Health of Navy,' 1863).

The following year, 1864, the ratio mounted to the enormous figure of 177·7 per 1,000 (for both primary and secondary, as no distinction between the two was made in statistics till 1866). In May this year a battalion of marines arrived, and was stationed at Yokohama; eighty-six cases of syphilis were recorded amongst the men, having been contracted in the following seven months of the year. Fifty-two cases of syphilis, contracted at Yokohama, were returned by the medical officer of the *Conqueror* in 1865, who writes :—

During the time the ship was at anchor, a proportion not far short of half the total amount of sickness was caused by venereal cases. (i) Fifty-six per cent. of the cases were non-infecting; (ii) thirty-four per cent. were infecting sores, many of them typical, but even then not necessarily followed by constitutional syphilis; whilst several sores, followed by distinct secondary symptoms, were more allied to the ulcerative than to the adhesive form of inflammation; (iii) ten per cent. were originally, or became, phagedenic ('Health of Navy,' 1865).

Other observers remarked that the disease contracted in Japan about this time was of a far worse nature than they had hitherto elsewhere seen; more than one-fourth of the total sick-rate on the station in 1865 was occasioned by venereal disease. For the next ten years, 1866 to 1875, the average ratio for primary syphilis was 94·5 per 1,000, and that for secondary 40·04,

giving a combined ratio of 134·54 per 1,000, an increase of 28·04 on the ratio for the previous ten years. Two hundred and sixteen men were invalided from the station on account of the disease during this period, against two hundred and eighty-seven during the previous ten years, enormous totals which prove the severity of the symptoms—sixty-two alone were invalided in 1865 !

In 1866 it was remarked that Hakodati was the only port in Japan where any attempt was being made by the Japanese authorities to prevent the spread of venereal diseases ; there was a small Lock Hospital where voluntary examination of the women was carried out, but the system was insufficient to cope with the amount of disease.

In consequence of an increase of syphilis having been noticed at Hong Kong, probably an increment from Yokohama, an order was issued by the Commander-in-Chief, directing that all men should be examined by a medical officer before going on shore, in order to detect cases of concealment of the disease. For a long time the naval and military authorities at Yokohama had desired that some measures should be taken to limit the spread of syphilis, but the unsettled political condition of the country prevented any reforms of this nature until 1868, when a naval medical officer, Surgeon G. B. Newton, was detached for service on shore to carry out the Contagious Diseases Act in Yokohama. He arrived there on April 4, at the time when the government of the Mikado replaced that of the Taikun. On May 1 a dispensary was fitted up in the Yoshiwara (the enormous brothel of Yokohama), where he started operations, being assisted by native doctors. A Government Lock Hospital, to accommodate a hundred patients, was completed in August, and opened for their treatment. Medical examination of the public women, to the number of twelve hundred, began on August 12, and the average number found to be diseased was 23·5 per cent. of those examined. Every woman in the Yoshiwara was inspected once a week. Dr. Newton also succeeded in persuading the authorities to put a stop to the vagrant prostitution clandestinely carried on in the so-called ' hotels ' and low grog-shops, and any woman who

was found wandering about at night without a pass ('fuda') was arrested and sent to the Lock Hospital. As an instance of the necessity for such a proceeding, out of forty women arrested in one night only, twenty were found to be diseased! The surgeon of the *Ocean* observes in 1869:—

Undoubtedly the appointment of a medical officer for special service in connexion with the Lock Hospital at Yokohama, the head-quarters of the Japan Squadron, must have tended to mitigate the ravages of this fell disorder among the officers and men of the navy employed on this station; but despite all the precautions adopted, much yet remains to be done ere the port can be declared even moderately free from infection. As it is, I consider it now, after having been for many months under supervision, the most infected and exhibiting the worst forms of the disease I have yet seen in the East ('Health of Navy,' 1869).

He again wrote, in 1870:—

The 'soft' sore throughout its whole course was the most common form, in the ratio of 6 to 1, was generally attended with induration or suppuration of one or more inguinal glands, and as frequently followed by every form of constitutional syphilis as the indurated one, so constantly that it was utterly impossible to pronounce with anything approaching moderate certainty, whether or not the patient on his discharge with the local lesion healed would be free in the future from constitutional manifestations of the disease ('Health of Navy,' 1870).

At the newly-opened port of Kobé disease was reported to be prevalent, at Yokohama it was much less common. At Singapore, where syphilis of a phagedenic type was observed in 1869, a Contagious Diseases Act was passed, but had not come into force by 1870. The *Barrosa* remained at Singapore 110 days, and leave was given twice a week for special and privilege leave men, and about once a month to the remainder; several cases of syphilis were contracted, and the surgeon gives the number of days' loss of service from venereal disease due to this port to be 1,280!! The same ship was 176 days at Yokohama, and similar leave was given, and the days' loss from the disease was 56!

Staff-Surgeon Newton visited Nagasaki in November 1870, for the purpose of obtaining permission from the governor to introduce in that town a system similar to that in operation at Yokohama, and was successful. A Lock Hospital was started on November 24, 1870, and at the examination of the women syphilis was found to be the commonest form of venereal disease amongst

them. This hospital, which promised to effect for Nagasaki the good that a similar establishment had done for Yokohama, was suddenly closed, by order of the governor, after a short period. Dr. Newton immediately left Yokohama for Nagasaki, to endeavour to get the hospital reopened, but his death prevented the accomplishment of his plans ; he was succeeded by Surgeon Sedgwick, R.N. An increase of 47·1 per 1,000 occurred in 1872 over the ratio for 1871. Much of this increase was due to the breaking up of the Yoshiwara, Yokohama, on November 1, all the women being granted freedom, and all left, even those (131) under treatment for the disease in hospital ! At this time general leave was being given by the ships in port, and many cases of syphilis came under treatment, the marine battalion suffering severely ; on urgent representation to the authorities of the evil of such an action, the supervision of the women and hospital treatment were reinstituted on November 18. ‘ Eighty-seven per cent. of Yoshiwara women (Nagasaki) are said to be infected and others wander about the place uncontrolled ’ (‘ Health of Navy,’ 1872). In 1873 it was noted of Hong Kong, ‘ Owing to the excellent working of the Act, venereal complaints are reduced to a minimum ’ (‘ Health of Navy,’ 1873). The Lock Hospital at Nagasaki was reorganized by Staff-Surgeon B. Hill, R.N., in 1874 ; an enormous amount of syphilis was found to be existing in the brothels of that place ; nothing was done at Kobé, where there was also a great deal of the disease.

The average ratio for primary syphilis for the next ten years, 1876 to 1885, was 62·25 per 1,000, and that for secondary 25·09 per 1,000 ; these show considerable reductions, in comparison with the corresponding ratios for the previous ten years, of 32·25 and 14·95 respectively.

In 1876 the medical officer of the *Thalia* gives an interesting table showing the number of cases of primary syphilis treated on board during 1873, 1874, 1875, and 1876, with the locality of infection. He states that out of fifty-eight cases of primary syphilis, thirteen were attended with secondary symptoms, and that forty-seven of the total number were infected in unprotected ports. Syphilis contracted at Singapore proved, as a rule, to be

severe. The appended table fairly illustrates the prevalence of syphilis on the station during these years :—

<i>Year.</i>	<i>Place.</i>	<i>Protected or Unprotected.</i>	<i>Days at Anchor.</i>	<i>No. of Cases.</i>
1873	Singapore	protected	118	3
"	Hong Kong	"	56	1
"	Penang	unprotected	58	14
1874	Singapore	protected	39	—
"	Penang	unprotected	8	2
"	Hong Kong	protected	54	1
"	Yokohama	"	110	2
"	Nagasaki	unprotected	39	4
1875	Kobé	"	9	5
"	Yokohama	protected	90	3
"	Nagasaki	"	4	1
"	Hong Kong	"	15	—
"	Shanghai	unprotected	202	11
1876	"	"	54	10

The beneficial results obtained from the operation of the system of inspection instituted by Dr. Newton, R.N., at Yokohama, are well commented upon in the Civil Surgeon's Report, 1878, as follows :—

This (syphilis), one of the most frequent diseases, has become less common in Yokohama since the Government undertook the medical supervision of prostitutes. In 1868 the percentage of cases admitted to hospital was 24·4; the latter part of that year the present system of inspection and control was commenced, and the ratio was slightly reduced in 1869, then 21 per cent. In 1870 and 1871, by which time the control system was in full operation, the proportion was reduced to 9·8 and 6·7 per cent.!! In 1872 it rose to 15·8 per cent., dropped in 1873 to 6·9 per cent., and since 1873 has ranged from 11 to 12 per cent. It will thus be seen that there has been on the whole a marked improvement since the establishment of intelligent medical supervision of the native brothels, but that this improvement was greatest within the years immediately succeeding upon the inauguration of the new system; the increase of the admissions for syphilis after 1871 is easily explainable in accordance with the universal experience that where Government supervision of recognized and registered prostitutes is most rigid, *secret*, and therefore more dangerous, prostitution increases steadily in proportion to effectiveness of the control on the registered houses. Such *secret* prostitution is getting more common in Yokohama year by year; it is carried on in connexion with the sailors' taverns to a considerable extent, while one of the most travelled thoroughfares between the settlement and the Bluff is lined with unlicensed and uncontrolled brothels.

During the next period of ten years, 1886 to 1895, the average ratio for primary syphilis was 71·1 per 1,000, for secondary it was 35·8; both show increases of 8·86 and 10·71 respectively over the ratios for the previous ten years. Eighty-five men were invalided

on account of the disease, against seventy-three during the last period of ten years.

The medical officer of the *Audacious*, flagship, which returned thirty-two cases, writes in 1886:—

The cases were pretty nearly equally divided between Hong Kong and Yokohama, at both of which places the Contagious Diseases Regulations are very fairly worked and have undoubtedly done a great deal of good, as the severe cases of phagedenic sore, so common a few years ago, have almost disappeared; with very few exceptions the cases admitted to the sick-list were soft sores, not accompanied by bubo or followed by secondary affections. . . . It may not be out of place here to mention that early in this spring the question of doing away with the Contagious Diseases Acts was raised at Shanghai, in the Municipal Council of that place. Representations were made, both by the English and French admirals, of the probable consequences of such a course being adopted, and the matter was dropped, which, in the interests of the fleet, must be considered a matter for congratulation. The Administrator of the Government at Hong Kong having communicated with the Admiral as to any reasons existing why the Acts should not be done away with in the colony of Victoria, a strong remonstrance against such a proceeding was sent in, calling attention to the beneficial results of the working of the Acts both in Hong Kong and Japan ('Health of Navy,' 1886).

The medical officer of the *Champion* gives the following table, illustrating the state at various ports in 1886:—

<i>Place.</i>	<i>Days' Stay.</i>	<i>Cases of Primary Syphilis.</i>	<i>Remarks.</i>
Nagasaki	27	4	No general leave given.
Kobé	10	—	
Yokohama	58	10	
Shanghai	49	4	No general leave given.
Chefoo	25	—	

The preventive measures taken in the Japanese ports do not produce a very satisfactory result, even as compared with Shanghai, where the anomalous condition exists of compulsory examination without the power of detaining infected persons. The prevalence of venereal disease in the Treaty Ports of Japan is due to the vast amount of unlicensed prostitution carried on *sub rosa*. Most cases, on inquiry, turned out to have been contracted in a grog-shop or tea-house, and not in the licensed quarter ('Health of Navy,' 1886).

At Hong Kong, on September 1, 1887, the compulsory examination under the Contagious Diseases Acts was discontinued; also at other places on the station, and for the following years to the end of this period there was a steady increase in the ratio for syphilis. Disease was exceptionally prevalent at Singapore in 1890, and the medical officer of the *Egeria* remarks:—

This place, from being comparatively free before the Contagious Diseases Acts

were abolished, has now the unenviable notoriety of being one of the worst places for contagious diseases.

The medical officer of the *Orion* also notes :—

The folly of suppressing the Acts has probably never been more apparent than at Singapore . . . with its vast population of different races and its large preponderance of males over females ('Health of Navy,' 1890).

In 1891 the medical officer of the *Victor Emmanuel* writes concerning Hong Kong :—

On visiting the hospitals where Chinese women present themselves for treatment the terrible ravages of syphilis are painfully impressive, and up to the time of their application for relief they have not been subjected to any kind of treatment, and the disease has played havoc quite unchecked. Our men are exposed to such risks, and out of a crew of barely 300 men over 50 have been about 700 days unfit to do active duty ('Health of Navy,' 1891).

At Singapore a reversion to the former severe type was noted, and the medical officer of the *Pallas* writes :—

In Singapore syphilis of the worst type is common, and in my experience it is not unusual to come across twelve cases of true 'Hunterian' chancre in one small ship, which means 6 per cent. of the men ('Health of Navy,' 1893).

For the period 1896 to 1908 the average ratio for primary syphilis was 46·14 per 1,000, and that for secondary 29·7. Both show reductions compared with the previous ten years, of 25·7 and 6·1 respectively; 183 men were invalided from the station during the period from syphilis. In 1897 a considerable increase was noted in the ratio for primary syphilis; it rose to 98·44, the highest since 1874, and a large amount of disease was reported to exist at all places over the station. Towards the latter part of the period the prevalence and virulency of the malady amongst the men of the fleet showed a diminution.

Chancroid can be compared with primary syphilis from 1905 as follows :—

1905.	Chancroid	57	cases,	Primary	Syphilis	172	=	1 : 3
1906.	"	99	"	"	"	107	=	1 : 1·08
1907.	"	130	"	"	"	85	=	1 : 0·65 or 3 : 2
1908.	"	105	"	"	"	60	=	7 : 4

In comparing the China Station with the rest, the enormous amount of syphilis that has prevailed among the ships is very evident; by far more disease, at times of an exceedingly virulent type, has been contracted at ports on this station than on any

other, the Pacific Station even not contributing so much. Eight hundred and forty-four men were invalided altogether since 1856 and twenty deaths from syphilis were recorded on the station.

SECTION 7. AUSTRALIAN STATION

In former years ships were detached occasionally from the East Indian Squadron to cruise in Australian waters and among the islands of the South Sea. Syphilis was reported to be of rare occurrence, and very few cases were contracted at the ports visited.

The average ratio for the ten years 1856 to 1865 was 22·67 per 1,000 of force. In 1856 there were five vessels with a mean strength of 540 men, and the majority of cases of syphilis during this period were originally contracted in English home ports and at various places on the passage out to the station, notably at the Cape ports and St. Helena. In 1858 only five cases were reported, and in 1859 twenty-nine were returned, most of which were contracted at Sydney. Very little syphilis was reported to be present in the New Zealand ports visited. The surgeon of the *Pelorus*, which vessel returned seventeen cases in 1862, remarks :—

Venereal affections have maintained their evil reputation as the occasion of serious loss of service, in this respect far exceeding any other class of complaint, the average duration of each case being 30·5 days. They, however, were not numerous, which, considering the frequent leave afforded to the ship's company, is fortunate. The sores were mostly of a superficial suppurating character . . . proving protracted and difficult to heal. In two cases severe secondary syphilis made its appearance. Gonorrhoeal complaints were found in New Zealand, syphilis being encountered in Australia ('Health of Navy,' 1862).

For the next period of ten years, 1866 to 1875, the average ratio for primary syphilis was 29·82 per 1,000, and that for secondary 13·98, the combined ratios giving an increase of 21·1 over that for the preceding ten years. In 1866 there was a considerable increase in the number of cases reported, and the surgeon of the *Eclipse* writes :—

Some of the chief medical men of Sydney told me that they observed a great increase, very recently, of syphilis among the lower orders, and the sanitary state of our crew while there, and subsequently, bore out the correctness of their observation. Whereas in former years, during nearly as long a stay there and the men having the same amount of leave, they either escaped altogether or perhaps one case of syphilis showed itself, on this occasion there were six attacks, five of which were primary cases with suppurating sores surrounded by a hard

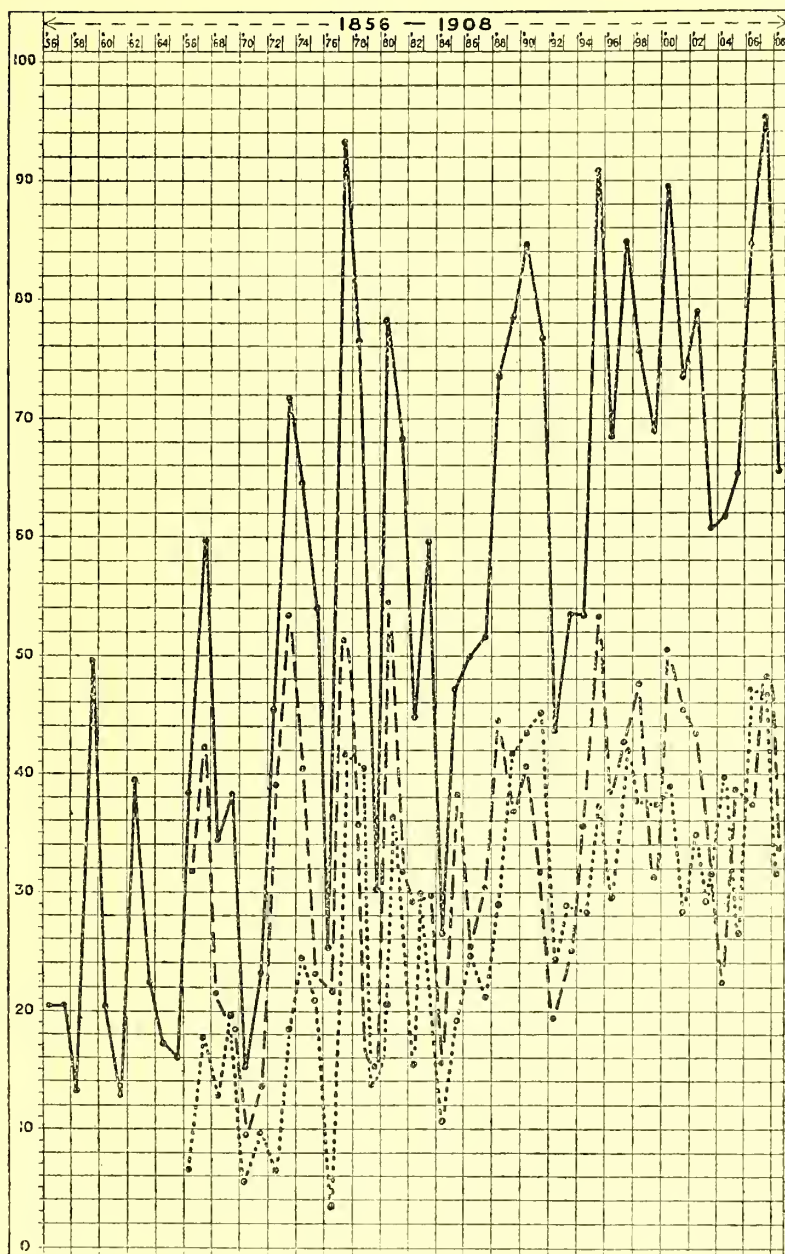


FIG. 25. Incidence of syphilis on the Australian Station, 1856-1908.

cartilaginous-like condition of the adjacent tissues. . . . Prostitution has greatly increased in Sydney of late, and it was the subject of remark among the medical men that a large majority of the prostitutes were very young girls, Australian born. Formerly Sydney was remarkable for the very small amount of disease that prevailed in so large a place ; the same, however, cannot be said of it now (' Health of Navy,' 1866).

Syphilis was also reported to be more noticeable in New Zealand at this time ; there had been a garrison of Imperial troops in the island since the Maori War. The Contagious Diseases Act was in force in Queensland in 1868, but in none of the other colonies. The medical officer of the *Challenger* notes of Melbourne :—

The number of cases added to the sick-list, as well as the days' sickness, is considerably in excess. This circumstance is mainly owing to the very severe form of venereal complaints contracted during our short stay at Melbourne in the latter end of December 1868. These syphilitic complaints were more severe in character than any I have previously witnessed on the Australian station, in several instances being followed by buboes and very obstinate and protracted secondary symptoms (' Health of Navy,' 1869).

In 1872 there was a considerable increase in the primary ratio to the extent of 25·6 per 1,000 compared with 1871. The *Clio* returned twenty-six cases, and the surgeon remarks :—

In the first quarter of the year, sixteen of these were contracted at Hobart Town, Tasmania. In the second, the contagion was got by three men in Western Australia ; in the third by three, and in the fourth by four at Sydney. . . . The sores contracted at Hobart were of mixed variety . . . from the excessive irritability of these sores there would seem to be a great want of cleanliness among the Hobart Town unfortunates. Sores contracted in Western Australia and Sydney were more amenable to treatment (' Health of Navy,' 1872).

At Sydney, in 1873, syphilis was stated to have become decidedly more prevalent. Some interesting remarks on syphilis were made by the medical officer of the *Basilisk*, in his journal for 1874 :—

There is another point of interest that I will allude to, and that is the severity and infecting nature of the disease contracted at Amboyna and Singapore compared with that received in our Australian colonies and in Europe. Does this increased virulence arise from congress between races so widely divided, or does the general syphilization of the civilized country account for it ? It is a problem most interesting both as regards ethnopathology and miscegenation, the discussion of which leads us back to the history of the virulence of this disease when first introduced into Europe. One fact I was informed of negatives the idea that the severe character of the disease contracted at Singapore is owing to climate, or to the constitution of the recipient being impaired, as it is asserted that, while disease contracted from Chinese and Malay women, even belonging to the upper grade of prostitutes, is almost always infecting and severe, that got from intercourse with European prostitutes resident there is comparatively mild, the majority of sores being non-infecting (' Health of Navy,' 1874).

This extract is given for what it is worth, as the last paragraph is decidedly open to doubt. For the period of ten years, 1876 to 1885, the average ratio for primary syphilis was 32·13 per 1,000, and that for secondary 22·37; both show increases on the ratios for the foregoing ten years, of 2·31 and 8·39 respectively.

In 1876 two cases were reported from Samoa, the first so far recorded as having been contracted there. Next year, 1877, a considerable increase in the primary ratio was noted, 29·33 over that for 1876, and the secondary showed an increase of 38·42! The medical officer of the *Nymphe* gives as an explanation for the increase :—

Syphilis appears of late to have been on the increase in Sydney, and in endeavouring to ascertain some of the causes for the same, I learnt, what I believe to be the fact, that one of the effects of the recent passing of a Contagious Diseases Act by the Legislature of the neighbouring colony of Queensland is that when prostitutes there now become infected, to avoid coming under its operation they at once migrate to Sydney, where they can ply their trade without any hindrance.

He also reports the following interesting case :—

Two stokers who were on leave, in consequence of some disagreement whilst under the influence of drink, fought, and during the scuffle one of them, who at the time had syphilitic ulceration of the fauces, tonsils, and adjoining parts, inflicted a rather severe wound on the other's left cheek with his teeth by biting. The wound shortly assumed the aspect of a genuine primary syphilitic sore and was followed three months subsequently by constitutional symptoms ('Health of Navy,' 1877).

In 1880 the primary ratio ran up to 57·47! A great increase at Hobart Town was reported, Sydney and Melbourne being the chief sources of contagion in Australia.

The average ratio for the ten years 1886 to 1895 for primary syphilis was 35·24 per 1,000, and for secondary 33·08; both ratios show increases over the ratios for the preceding ten years, of 3·11 and 10·71 respectively. It will be noticed, by looking at the chart, that the ratio for secondary syphilis has shown an almost continuous rise, and in many instances it is as high or higher than the primary, which illustrates the severe type as met with on the station; moreover, the invaliding rate also increased during this period. Most of the cases were contracted at Sydney, but with reference to Hobart the medical officer of the *Orlando* writes in 1891 :—

In former years Hobart Town had the worst reputation for venereal disease of

any place on the station, but during our present commission I am glad to be able to report a very great improvement in this respect, as the cases now are not nearly so numerous as they used to be during our visits to this port. This is no doubt due to the enforcement of the Contagious Diseases Acts. . . . Syphilis in a virulent form was so prevalent at Hobart Town some eight years ago that I considered it my duty to make an official representation on the subject ('Health of Navy,' 1891).

In 1893 the same officer remarks :—

Twenty-six cases are included in my returns; this by no means represents the number treated on board, but only those who were unfit for duty, the others being ordered to attend every day regularly for treatment.

There was a large increase in the number of cases returned in 1895; from all parts of the station the disease was reported to be more prevalent, and especially at Sydney.

For the period 1896 to 1908 the average ratio for primary syphilis was 39·09 per 1,000, and that for secondary 36·55. In comparison with the ratios for the preceding ten years both show increases, viz. 3·85 and 3·47 respectively.

The severity of the disease was still maintained, and Sydney was stated to be the port on the station where most syphilis was contracted.

Chancroid is tabulated separately in 1905, and for this year and the following three the proportion to primary syphilis is :—

1905.	Chancroid	27 cases,	Primary Syphilis	73 = 1 : 2·7
1906.	"	64	"	" 58 = 1 : 0·9
1907.	"	78	"	" 78 = 1 : 1
1908.	"	67	"	" 42 = 1 : 0·627

In 1906 the ratio for secondary syphilis, 47·07, was the highest recorded for fifty years, and the striking feature of the disease on this station is the high ratio for that form. One hundred and fourteen men were invalided, on account of syphilis, from the station, and six deaths were recorded, since 1856.

SECTION 8. IRREGULAR FORCE

The amount of syphilis returned in the statistics of the Irregular Force has always been considerable from the earliest times; thus, for instance, for the years 1836 to 1843 the average annual ratio per 1,000 was 75·4, the majority of the cases having been contracted at the home ports.

In the period 1856 to 1865 the average ratio was 118·7, an exceedingly high one. Nine-tenths of the cases that occurred

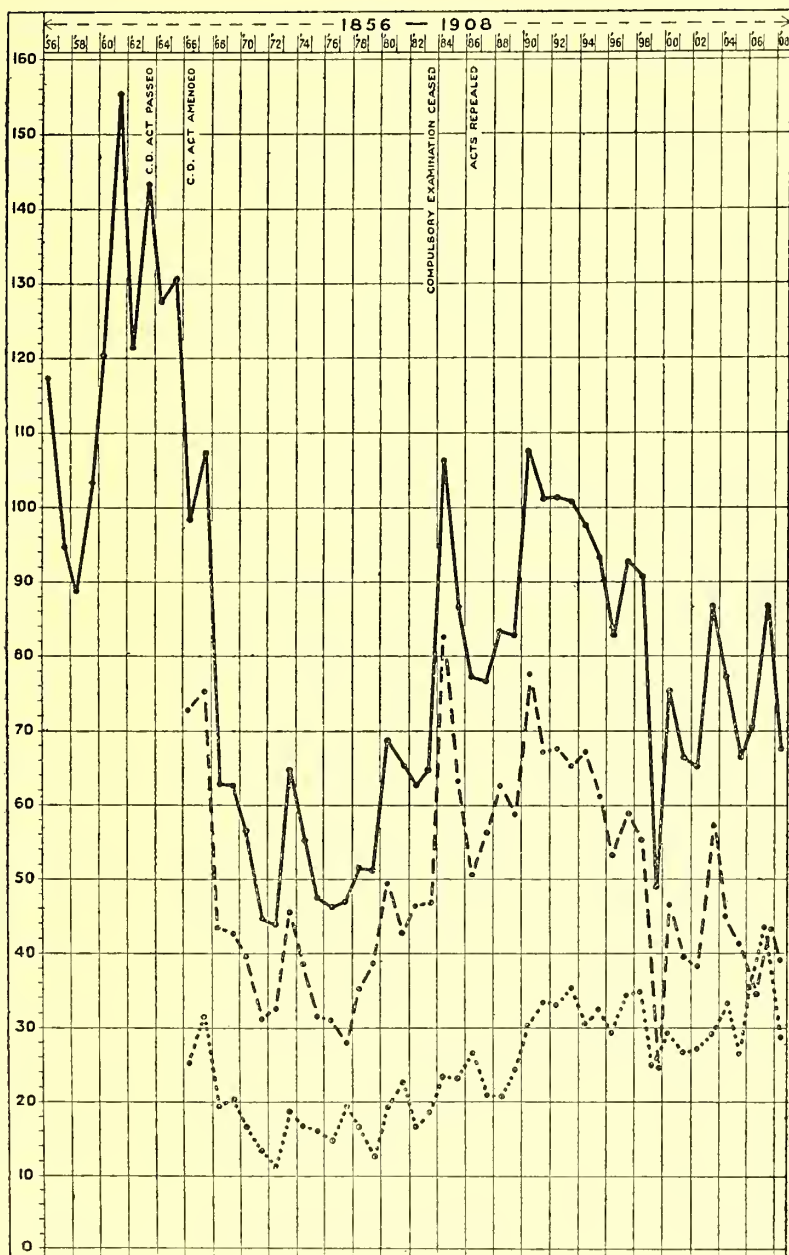


FIG. 26. Incidence of syphilis in the Irregular Force, 1856-1908.

were contracted at English ports, so much disease did there exist at these places during this period (*vide* Home Station). Contrasting home and foreign ports in 1865, the medical officer of the *Caledonia* writes :—

It is instructive to note the difference in the results, as far as syphilis is concerned, to men on leave in the home ports and some of the foreign ports where special and general leave was granted. Fifty-two cases of syphilis were entered on the sick-list ; of this number twenty-six, exactly half, were entered while the ship was fitting out. It is not unreasonable to suppose that, although the men were drafted from different ports, ostensibly in a sound condition (being supposed to have been examined previous to their discharge), the majority of these cases were contracted at Plymouth, where the enactments of the Contagious Diseases Act were in operation. Four more cases were entered within ten days after our departure from England, thus leaving the comparatively small number of twenty-two men infected during six months' service in the Mediterranean, where the crew had frequent leave in ports where registration and surveillance are enforced ('Health of Navy,' 1865).

For the next ten years, 1866 to 1875, the average ratio for primary syphilis was 43·8 per 1,000, and that for secondary 20·49, a decrease of 54·41 of the combined ratio on that for the preceding ten years, due to the operation of the Contagious Diseases Acts at the several home and foreign ports. From 1876 to 1885 the average ratio for primary syphilis was 47·73 per 1,000, and for secondary 16·38, an increase of 3·93 in the primary and a reduction of 4·11 in the secondary, compared with the ratios for the preceding ten years. In 1876 the detached squadron employed on the East Indian and China Stations for the greater part of the year returns the largest number of cases. The ratio rose in 1884, the year after the abolition of compulsory examination in connexion with the Contagious Diseases Acts. Syphilis was of common occurrence among the crews of the Indian transports, due to leave at Bombay. The amount of the venereal disease in the Irregular Force was mostly influenced by the conditions prevailing at the home ports, and when the Acts were suspended the increase of syphilis was very apparent ; thus, in 1884, the medical officer of the *Minotaur* remarks :—

The cases of venereal disease altogether are more numerous this quarter (winter) than any previous one since the ship has been in commission. In every return I have made since the suspension of the Contagious Diseases Acts I have had the same statement to make, but in this quarter not only are the cases increased, but the total number of days under treatment is much greater in proportion than on any previous occasion ('Health of Navy,' 1884).

For the ten years 1886 to 1895 the average ratio for primary syphilis was 63·38, and that for secondary 28·55, increases on the ratios for the preceding ten years of 15·65 and 12·17 respectively.

The medical officer of the troopship *Himalaya*, writing in 1886, makes the following statement :—

Since the abolition of the Acts, syphilis has not only become more prevalent in our naval seaport towns, but the form of the disease has become much more serious. When the Acts were in force the majority of the cases occurring were of the soft, non-infecting character, and were easily cured by local remedies ; now, however (speaking from my own experience), the largest number are well-marked cases of constitutional syphilis, requiring a prolonged course of treatment (‘ Health of Navy,’ 1886).

For the period 1896 to 1908 the average ratio for primary syphilis was 45·8 per 1,000, and that for secondary 30·65, a reduction, when compared with those of the preceding ten years, of 17·58 for primary, but an increase of 2·1 for secondary.

A comparison between chancroid and primary syphilis can be made for four years :—

1905.	Chancroid	74 cases,	Primary Syphilis	139 = 1 : 1·87
1906.	„	47 „	„ „	78 = 1 : 1·6
1907.	„	64 „	„ „	38 = 1·6 : 1
1908.	„	58 „	„ „	24 = 2·4 : 1

The influence of the Home Station on the statistics of the Irregular Force is shown by the similarity of their respective charts. Three hundred and twenty-two invalidings for syphilis took place during the fifty-three years, and six deaths occurred in the Irregular Force.

SECTION 9. ROYAL MARINES AT HEAD-QUARTERS

Marines at head-quarters do not form part of the service afloat, consequently the statistics relating to disease in the corps are not shown in those for the total force. Marines serving on board ships, on the other hand, are included in the services afloat, and their sickness is taken with the station to which the ships are attached.

Statistical tables for head-quarters marines are first given in 1882 ; obviously all the primary syphilis was contracted in the home ports (Fig. 27).

The force is constituted as follows :—

Chatham division	.	.	.	infantry
Portsmouth division	.	.	.	"
Plymouth	"	.	.	"
Portsmouth	"	.	.	artillery
Walmer Dépôt.				

The mean force in 1908 was 7,070.

For the first four years, 1882 to 1885, the average ratio for primary syphilis was 84·2 per 1,000, and for secondary 32·13.

For the following ten years, 1886 to 1895, they were 64·83 and 33·17 respectively, and for 1896 to 1908 they were 24·6 and 19·06.

Comparisons between chancroid and primary syphilis are as follows :—

1906.	Chancroid	38 cases,	Primary Syphilis	133 = 2 : 7
1907.	"	41	"	" 69 = 10 : 17
1908.	"	82	"	" 45 = 9 : 5

The following table has been constructed to show at a glance the prevalence of syphilis on the various stations, from the average ratios per 1,000 of force for the disease at corresponding periods (slightly altered for Cape of Good Hope, West Coast of Africa, and East Indian Stations):—

TABLE XII

<i>Stations.</i>	<i>Primary and Secondary.</i>		<i>Primary Syphilis.</i>			
	1837-43	1856-65	1866-75	1876-85	1886-95	1896-1908
Home	46·1	90·17	40·47	50·84	61·56	37·51
Mediterranean	33·0	48·8	39·61	36·91	36·13	23·66
N. America & W. Indies.	30·4	40·01	41·23	46·7	32·18	34·3
S.E. Coast of America .	21·7	34·1	20·44	28·62	26·08	25·25 *
Pacific	36·4	52·03	62·76	58·54	37·66	22·58 †
China	—	106·5	94·5	62·25	71·1	43·3
Australian	—	22·67	29·82	32·13	35·24	39·09
Irregular force	75·4	118·7	43·8	47·73	63·38	45·72
Head-quarters Marines .	—	—	—	84·2 ‡	64·83	24·6
Cape of Good Hope and West Coast of Africa .	33·4	24·7 §	—	—	—	—
Cape of Good Hope and East Indies	—	69·3 ||	—	—	—	—
			1869-78	1879-88	1889-98	1899-1908
Cape of Good Hope and West Coast of Africa .	—	—	22·49	31·13	32·51	17·55
East Indies	—	—	59·86	48·11	69·41	39·4

* 1896-1903.

† 1896-1904.

‡ 1882-85.

§ 1856-68.

|| 1864-68.



FIG. 27. Incidence of syphilis in the Royal Marines, Head-quarters, 1882-1908.

The predominance of the China Station will be noticed, the next in order for the foreign stations being Pacific and East Indian, in furnishing the highest ratio. The lowest ratio is that for the South-east Coast of America Station. With the exception of the Australian, where there has been a progressive increase since statistics were commenced, the ratio on all stations has undergone a reduction in the past twenty years.

Four years' statistics can now be given for chancroid and primary syphilis. It is to be regretted that a distinction between the two was not made before 1905 in the reports.

With the Home Station, the cases in the Channel and Atlantic Fleets are taken. The earlier figures are no doubt incorrect, the proportion for chancroid being evidently too low, that for 1908 being more accurate, yet it has been before mentioned that several cases of primary syphilis were not entered on the sick-lists of ships, the men being treated on the attending list, and consequently do not appear in statistics. The facing table, however, gives the incidence of chancroid and primary syphilis according to the official returns.

INCIDENCE OF CHANCROID AND PRIMARY SYPHILIS

TABLE XIII
TO SHOW THE INCIDENCE OF CHANCROID AND PRIMARY SYPHILIS ACCORDING TO THE OFFICIAL RETURNS.

Station.	1905.			1906.			1907.			1908.		
	Chancroid.	Primary Syphilis.	Pro-portion.	Chancroid.	Primary Syphilis.	Pro-portion.	Chancroid.	Primary Syphilis.	Pro-portion.	Chancroid.	Primary Syphilis.	Pro-portion.
Home	814	1,972	0.4 : 1	1,185	1,428	0.8 : 1	1,321	1,134	1.16 : 1	1,457	781	9 : 5
Mediterranean . . .	141	230	0.6 : 1	188	136	1.38 : 1	152	63	2.4 : 1	182	77	12 : 5
N. America and W.												
Indies	55	94	0.58 : 1	55	50	1.1 : 1	93	51	1.8 : 1	36	24	3 : 2
East Indies	6	37	0.16 : 1	26	15	1.7 : 1	58	7	8.2 : 1	36	16	9 : 4
Cape and W. Coast of Africa	—	—	—	8	16	1 : 2	9	5	1.8 : 1	11	13	4 : 5
China	57	172	0.33 : 1	99	107	0.9 : 1	130	85	3 : 2	105	60	7 : 4
Australian	27	73	0.36 : 1	64	58	8 : 7	78	78	1 : 1	67	42	3 : 2
Irregular	74	139	0.53 : 1	47	78	0.51 : 1	64	38	1.6 : 1	58	24	5 : 2
Head Quarters Marines	—	—	—	38	133	2 : 7	41	69	10 : 17	82	45	9 : 5

TABLE XIV

TABLE GIVING THE TOTAL NUMBER OF CASES OF DISEASE AND INJURY AND NUMBER OF CASES OF SYPHILIS FROM 1856 TO 1908 IN THE SERVICE AFLOAT, AND THE RATIO PER THOUSAND OF THE LATTER TO THE FORMER

<i>Year.</i>	<i>Total No. Cases of Disease and Injury.</i>	<i>Cases of Syphilis.</i>	<i>Ratio.</i>	<i>Year.</i>	<i>Total No. Cases of Disease and Injury.</i>	<i>Cases of Syphilis.</i>	<i>Ratio.</i>
1856	73,195	3,896	53·2	1883	47,294	3,467	73·3
1857	66,546	2,394	35·9	1884	49,814	3,764	75·5
1858	75,924	2,632	34·6	1885	51,472	3,638	70·6
1859	81,325	3,718	45·7	1886	47,816	3,490	72·9
1860	90,329	4,519	50·02	1887	49,321	3,858	78·2
1861	91,276	5,003	54·8	1888	49,430	4,014	81·2
1862	88,661	4,521	50·9	1889	48,897	4,375	89·4
1863	78,664	4,369	55·5	1890	56,763	4,579	80·6
1864	72,138	4,385	60·7	1891	52,886	4,523	85·5
1865	69,316	4,313	62·2	1892	54,503	4,303	78·9
1866	64,064	3,539	55·2	1893	57,380	4,699	81·8
1867	65,045	3,502	53·8	1894	59,601	5,075	85·1
1868	63,112	3,307	52·3	1895	65,196	4,947	75·8
1869	59,326	3,115	52·5	1896	66,162	5,423	81·9
1870	56,688	2,689	47·4	1897	72,068	6,133	85·1
1871	57,231	2,424	42·3	1898	75,052	5,807	77·3
1872	54,697	2,994	54·7	1899	78,446	5,729	73·03
1873	54,534	2,796	51·2	1900	84,550	5,543	65·5
1874	53,286	2,529	47·4	1901	84,026	5,403	64·3
1875	51,422	2,254	43·8	1902	85,769	5,530	64·4
1876	53,908	2,136	39·6	1903	85,735	6,074	70·8
1877	50,583	2,323	45·9	1904	83,447	6,219	74·5
1878	54,626	2,364	43·2	1905	81,568	6,606	80·9
1879	49,976	2,585	51·7	1906	77,842	6,713	86·23
1880	52,487	2,935	55·9	1907	75,351	6,581	87·33
1881	50,705	2,913	57·4	1908	75,608	6,044	79·93
1882	49,929	2,716	54·3				

CHAPTER XXIX

THE EARLY TREATMENT OF SYPHILIS IN THE NAVY

THE mercurial treatment of syphilis, until profuse salivation was produced, so much in vogue among medical officers of the eighteenth century, and indeed practised by them in the early decades of the nineteenth, was undoubtedly exceedingly pernicious in its after-effects. Many of them followed out Boerhaave's instructions to the letter, 'until the breath begins to stink, the gums to ache, the teeth to grow loose, and stick out. Then ought the physician to attend carefully, and consider whether he ought to go on, to stop, or even to make some diversion. If the patient spits three pints or two quarts in four and twenty hours it is sufficient. If he spits less, you must again give one or more doses.' Happily, such heroic treatment is a thing of the past, and considering that it was meted out to the unfortunate patients indiscriminately for any kind of venereal disease, there is little wonder that so much concealment of the malady took place, and that such terrible cases of tertiary syphilis, in which considerable necrosis of bone was observed, were so frequently met with, more than probably aggravated by the unreasonable exhibition of the remedy. It is apparent that towards the end of the eighteenth century the ill effects of such treatment were recognized, for in Turnbull's 'Naval Surgeon' (*op. cit.*), published in 1806, the following directions for the treatment of syphilis are given :—

A course of mercury conducted in slight cases for six weeks, in others longer. During that time the medicines should be brought to show sensible effects on the constitution and disease. In mild cases three or four ounces of mercurial ointment, introduced by friction, will be found generally sufficient. But in obstinate cases from eight to ten ounces may be required and introduced into the system at sixty or seventy rubbings, one drachm being used every night. This course will take up three months or more.

Where inunction is disliked the following form may be used :—

R. Pil. hydrarg. gr. v. fit pil.
Bis vel ter in die sumend.

- R. Hydrarg. calcinat.
 Opii camphorae \bar{a} \bar{z} ss.
 Syr. simpl. q. s. ut ft. pil ix.
- R. Hydrarg. muriat. gr. iv.
 Aq. vitæ \bar{z} vi.
 Spir. lavand. comp. \bar{z} ij.
 M. ft. solut. cochlear. unum mane et nocte in aq. hordeat. sumend.

For the local treatment of the chancre he prescribed caustic and the application of various lotions of nitrate of silver, muriate of ammonia, sulphate of iron, or sulphate of zinc. Also pulv. rhubarbari, a little to be sprinkled on the sore once or twice a day and if painful to be mixed with opium in the proportion \bar{z} j to \bar{z} j; and succ. gastric. bovin. To be applied to the sore.

He also recommended the following 'Diet Drink':—

- R. Rad. sarsae \bar{z} iij.
 Rad. mezereon. \bar{z} i.
 Lign. guaiac.
 Cort. sassafras \bar{a} \bar{z} iij.
 Aq. bullient. lb. v.

A quart of this to be taken throughout the day.

Sir Gilbert Blane, in his 'Observations on the Diseases of Seamen', published in 1803, advises the inunction and internal administration of mercury as follows:—

In vera lue, anginâ scilicet, osteocopiis, exostosisibus et defœdatione cutis.

Illinantur membra quotidie cum unguenti ex hydrargyro fortioris drachmis duabus quotidie usque dum cleatur pytalismus per dies triginta quinque vel donec evanuerint symptomata. Interdum vice litûs adhibere conveniat vel calomelanos granum unum ter die, vel pilularum ex hydrargyro grana quinque bis die vel

R. Hydrargyri muriati grana octo, spiritus vinosi tenuis libram unam. Fiat solutio et sumatur unci dimidia bis die. In ulceribus tonsillarum pernotabili est auxilio suffitum ex cinnabare in fauces inhalare semel vel bis quotidie. Methodus autem per litum efficacissima est.

In cases of malignant sores he prescribed a lotion of acid. nitric \bar{z} ij, aq. pur. lb. j, the acid being diminished when the sore became less sensitive.

Bell, in his work on venereal diseases, disproved the identity of syphilis and gonorrhoea, and Ricord in 1838 distinguished between the two diseases; till that date the treatment for each was similar. Bassereau, a pupil of Ricord, in 1852 noted the distinction between soft and indurated chancres as regards their

sequelae, and in 1857 Fournier started the 'duality theory'. For some time afterwards it appears that medical officers of the fleet were divided into two parties with different views as regard the infectivity of venereal sores; in other words, they were either 'dualists' or 'unicists'.

The old plan of endeavouring to get the system under the effects of mercury so as to produce excessive salivation was gradually discontinued; some surgeons even did not administer it at all, preferring to trust to bitter tonics and to allow the disease to 'wear itself out'. However, this latter treatment did not appeal to many, and eventually it was the routine to give mercury in some form or other in all cases of syphilis. In the report of the committee appointed to inquire into the best mode of treatment of venereal disease in 1864, the opinion expressed was in favour of mercury as being the most efficient agent in the treatment of constitutional syphilis; it was stated that mercury could not be deemed a specific in the ordinary acceptation of the term, and that it did not appear to exercise any direct influence on the poison of syphilis but on the effects of the poison only! There is no doubt that the controversy between the advocates of the mercurial and non-mercurial plans of treatment did much good in preventing the misery that resulted from the abuse of this drug at the time, but this was to a certain extent counterbalanced by the evils that ensued through discarding it so much from practice.

The usual treatment on board ship about the year 1867 was as follows: The sores were cauterized with strong nitric acid and a water-dressing afterwards applied. In those chancres of an indurated character, mercury was given so as to slightly affect the gums and afterwards in a diminished dose, but its action was kept up until the sore healed and the hardness had disappeared. Or after cauterization, black-wash dressing was applied or some mercurial ointment. In the treatment of secondary symptoms mercury was given in the form of pil. hydrargyri, but more generally the bichloride in combination with iodide of potassium in infusion of gentian or cinchona. For condylomata, the application of strong hydrochloric acid speedily

followed by a dash of cold water was found to be most useful; the pain occasioned was but slight and transitory, and the men were able to go on with their duties. Iodide of potassium appeared to have been given rather indiscriminately at first, as sometimes it was prescribed before the secondary symptoms had shown themselves. In lieu of strong nitric acid as a caustic, carbolic acid was sometimes used for soft sores, but was not found so efficacious. Inunction was also employed; ten grains of the ung. hydrargyri were rubbed into the regions of the armpits every night and morning. The medical officer of the *Royal Alfred* writes in 1868:—

I think after all that the old plan of inunction is about the safest and most efficacious. The remedy was not used in any case until the induration of the sore became apparent, after which it was continued until no traces of the latter remained; but on the slightest evidence of the gums being affected, the quantity used was at once reduced, so that not in any one case was there the remotest approach to salivation. In every case either the pure nitric or carbolic acid was applied to the sores as they appeared, but the result has not been encouraging. In preference to drugs given internally, I have latterly, on board ship, substituted the inunction of ung. hydrarg. in diminished quantities, as recommended by Mr. Hilton. It is a plan well adapted for treatment on board ship ('Health of Navy,' 1868).

At the naval hospitals the mercurial vapour bath was extensively employed, and it was found to be the 'best, most convenient, and most manageable way' of applying the remedy. Together with the bath treatment a drachm of the liq. hydrarg. perchlor. in decoction of bark or sarsaparilla was generally prescribed during the twenty-four hours. In the late secondary and tertiary stages mercury was seldom given and then only in the form of the vapour bath. Iodide of potassium in ten-grain doses, administered three times a day, the mineral acids, and also cod-liver oil and generous dieting, were ordered in such cases.

The relative proportion of the secondary to the primary is fairly large, but in the year 1870 the Contagious Diseases Act had been in force for four years only, and it was stated that the former did not exhibit such formidable characters as in previous years and yielded more readily to appropriate treatment.

On the China Station at this period, where syphilis was so prevalent and secondary symptoms were reported to follow the

TABLE XV

TABLE SHOWING THE TOTAL CASES UNDER TREATMENT AT HASLAR IN 1870, THE REMEDIES EMPLOYED, AND THE TOTAL AND AVERAGE DAYS' SICKNESS WHILE UNDER TREATMENT WITH EACH REMEDY

	Total cases under treatment.	Total days' sickness.	Average days' sickness.	Remedies employed.											
				Mercury.			Pot. iod.			Mercury and pot. iod.			Quinine and iron.		
				Cases.	Total days' sickness.	Average days' sickness.	Cases.	Total days' sickness.	Average days' sickness.	Cases.	Total days' sickness.	Average days' sickness.	Cases.	Total days' sickness.	Average days' sickness.
Syphilis :															
Primary hard .	38	1,685	44.3	14	486	34.7	4	117	29.2	11	644	58.5	1	64	64.0
Primary soft .	89	3,517	39.5	18	557	30.9	10	485	48.5	17	935	55.0	10	463	46.3
Secondary .	93	4,626	49.7	9	393	43.6	27	1,064	39.4	38	2,530	63.9	14	485	34.6
													8	374	46.7
													34	1,077	31.6
													5	154	30.7

soft sore as often as they did the hard, so that it was not possible to say what sore would have constitutional sequelae, mercury was usually given in every case. The sloughing sore was treated with an application of perchloride of iron in glycerine, and when a healthy action was produced a lotion of chloride of zinc was applied. Internally hydrarg. cum creta and Dover's powder were prescribed as a rule. The green iodide was also a favourite remedy with some surgeons.

The following extracts from the journal of a medical officer on the Pacific Station in 1869, who did not agree with mercury, are given as a contrast :—

The treatment adopted was very simple, and, as a rule, very satisfactory. When secondary affections showed themselves, which in the patients who contracted disease at Valparaiso appeared to be rather more often the case than in those who had the disease from other sources, the treatment consisted in giving alternate doses of solution of iodide of potassium and solution of sulphate of iron, with local treatment to the throat, in cases where this was required, of inhalation of steam, medicated or not, as necessary, and the use of the chlorate of potash gargle. . . . Hot baths were sometimes used, and perfect cleanliness insisted on, and under these means the patient generally recovered after a certain time. Occasionally a mixture of iodide of potassium and potassio-tartrate of iron was used, and apparently with good effects. It has never been the practice to give even the smallest quantity of mercury for the cure of the disease, and I believe that very much injury results on all occasions from the employment of this drug in the treatment of venereal disease. Syphilitic rheumatism appears to be easily removed by the exhibition of iodide of potassium in ten-grain doses, or even in larger doses, if occasion require, and if it is at all obstinate, the exhibition of a few grains of quinine appears to have the effect of preventing its recurrence. Several cases have been treated on this plan with success. None of the more severe forms of the disease, nodes and other affections of the bones, lupia or secondary ulceration, have been present, and it is probable that they may not be seen except in very rare cases, and in those in which mercury has been used ('Health of Navy,' 1869).

The above views are undoubtedly extreme, but they are interesting in showing how personal views and fads in treatment were carried out then as in the present day.

It must be admitted, however, that until a fairly recent period the treatment of syphilis in the navy was conducted in a singularly haphazard manner; there was no continuity about it. A man presented himself with an indurated sore and was promptly put on a mercurial treatment until the sore had healed, and then, as a rule, all treatment was stopped until the patient reappeared with secondary symptoms, when mercury, or iodide

of potash and mercury, was again given. When drafted to another ship whilst under treatment for syphilis no mention was made of the fact that he was suffering with the disease, and as likely as not the treatment was again discontinued until severer secondary symptoms appeared. The surgeon of the *Edgar*, as far back as 1864, complains of the absence of any record of disease by which medical officers could obtain some information as regards their patients. He writes :—

The want of any continuous medical history of our patients is the first and greatest difficulty the naval surgeon has to contend with in investigating the pathology of the disease, and though this may be partially overcome by a regulation affecting continuous service men, there is so large a number of men who enter for a short time only, and who leave the service for longer or shorter periods of years, to re-enter when it may suit their convenience, that we can never have the same opportunities of observation as medical officers in the army; in proof of which I have only to state that out of 277 individuals who have been affected with syphilis between July 11, 1862, and December 31, 1864, only 137 remain on the ship's books, and of 134 cases of secondary syphilis occurring in 108 men, there have been 63 cases in 41 men of which I have been unable to obtain any precise history. Men sent to the naval hospitals do not bring back any record of their treatment when they return cured, so that even of those who continue on board, the information is very inexact and incomplete ('Health of Navy,' 1864).

This state of affairs was remedied shortly after the above complaint was written. A medical history sheet was introduced, which had to accompany the man's papers if he were drafted from one ship to another and also if he were sent to hospital. This was a step in the right direction, and though in many instances the sheets were lost and were replaced by temporary ones—blank forms giving no information whatever as to previous disease or injury—the innovation was of considerable help to the medical officer, and of late years more care has been taken with them.

The importance of a more thorough notification of syphilis in the navy and the necessity of its continuous treatment having been recognized, the question arose as to the issue of a special syphilis history sheet to accompany the man's other papers; such a one was not prepared, but the medical history sheet has been revised, and the medical officer can enter in the column for remarks all details concerning the case, such as its nature and the duration of the special treatment adopted.

M.—190 (late 128) (Revised—November, 1907).

MEDICAL HISTORY SHEET FOR SEAMEN AND MARINES.

Division
 Divisional Number
 Company
 Company Number

NOTE.—The information in the first three columns, and in that headed 'How disposed of,' is to be inserted on board every Ship, &c., in which a man serves, whether he may have been on the Sick List or not. When a Patient is received into Hospital the name of the Hospital is to be entered in the column of 'Ship's Name, &c.,' and all the entries in reference to his Disease, Discharge, &c., are to be inserted in *Red Ink*. The same course is to be adopted in the case of *Invalids* or *Men taking passage* on board ship, should they be placed on the Sick List. When a person is invalidated at a Home Hospital the word *Invalided* is to be in large writing, to indicate that he is unfit for further Service, and that the Sheet is finally closed. When a man is sick on leave, the nature and period of the illness should be entered in this Sheet, with a note to show that the man was on leave. *Special attention is called to Art. K.R. & A.I. 1306, A.* In column for 'Remarks' might be entered very briefly (1) nature and duration of special treatment for syphilis; (2) nature of operations (for hernia, etc.); (3) in case of injuries whether a Hurt Certificate was granted or not.

CHAPTER XXX

SOCIAL AND HYGIENIC CONDITIONS. IMPROVEMENTS. METHODS BY WHICH SYPHILIS MAY BE CONTRACTED

UNTIL the latter end of the eighteenth century the sanitary condition of the navy was truly deplorable, as may be learnt from many writers, and is particularly illustrated in Smollett's novels. Through the exertions of Sir Gilbert Blane about this time various reforms were introduced, especially the better observance of cleanliness of the person and of the ship itself. The manning of the navy was effected with volunteers who were seasoned men and by means of the press-gangs which secured recruits indiscriminately, many of whom were diseased and even the scum of prisons and towns, and whose influence upon the more steady members of a ship's crew worked in a most harmful manner; disease was more often concealed than reported, and when the surgeon was consulted in the end the patient's condition in many a case was terrible. Under such circumstances it is not at all surprising to find that an enormous amount of syphilis was then present in the navy. Then, again, the Bounty System, introduced in 1859, encouraged the entry of bad, useless characters who, as soon as it suited their convenience, exercised every ingenuity to get out of the service. The sickly condition of newly raised men, especially with regard to the fact that they were often affected with syphilis, is continually being commented upon by medical officers; the following extract illustrates this:—

A large number of these men came from the ill-fed classes of the community; they had all the appearance of a poor habit of body, and formed a strong contrast in their physical formation with the thoroughbred man-of-war sailor. They committed great excesses when on shore on leave, sold their clothes, and heedlessly exposed themselves to cold and wet.

The introduction of the continuous service system was a great improvement on the previous methods of obtaining recruits;

a much better class of men offered themselves and the system afforded greater facilities for manning ships with trained men, a state of affairs which did not exist before and an advantage which was unquestionably very considerable from a medical point of view. The men were better fitted physically for the nature of their work, and by their example they enabled new-comers to master difficulties with less bodily as well as mental fatigue than they otherwise would have expended. All this told upon the sanitary condition of the men and helped to keep the sick-list clean. The newly raised men were sent to guard-ships and drafted to other vessels as required. In the case of boys for entry into the service, it was laid down in the Regulations : ' No boys will be received from reformatories or prisons, or if they have been committed by a magistrate ; ' and again, ' No boy will be entered without the written consent of his parents, guardians, or nearest relations ; ' every boy was bound to serve on an average for thirteen years, reckoned from the date of his entry, when he signed his ' Continuous Service Engagement '. The improved moral standing of the bluejacket was repeatedly noticed by medical officers during the early years of the experiment, in contrast with the state of affairs that obtained in the days of impressment.

That the sailor is more prone to contract syphilis as compared with his brother in arms ashore is of course a fallacy, but it may be said that there are various conditions which in such a way influence his mode of life as to make him more susceptible to the ' Cult of Venus ' than perhaps would appertain to the landsman. For instance, the opportunity of going on shore on leave after a more or less prolonged stay on board, which was much more the case in former days, those of sailing ships before the introduction of steam power in the navy, when the passages from port to port and from station to station were often of long duration. It was then customary to grant forty-eight hours' leave on shore on arrival in port, and, after having been cooped up on board ship for perhaps several weeks, the liberty men landed with plenty of money to spend, which usually went in reckless debauchery. Much has been written concerning the customary habits of sailors on shore, and there is no doubt that much is true ; they

are an impressionable class, and in the olden days very few of them possessed sufficient strength of will to resist the incentives to drunkenness and debauchery so conspicuously displayed in seaport towns in those times, and where disease was so rampant and uncontrolled.

The shortening of sea voyages effected many improvements in this respect; the men were allowed ashore more frequently, and consequently had less money to spend in excesses; but the facility of access to the shore also had its disadvantages, especially in foreign ports, where every opportunity was offered. Low drinking-houses abounded in which cheap, fiery, and noxious liquors were sold, and not seldom, as has often been noted, the keepers of these establishments combined the calling of publican with that of procurator, particularly in the ports of the Far East. Boys entered from the Greenwich School and the training ships were found to be of a much better class than those entered direct into the service; they had experienced the advantage of a moral discipline to a certain extent lacking in the latter, so much is the importance of early training, particularly in the case of the bluejacket, who is left to act according to his own inclinations at a comparatively early age.

It has been said that the venereal peril is on an equal footing with alcoholism, which is one of the besetting sins to which the sailor is too often addicted. To what an enormous extent drunkenness prevailed in the navy in former times is only too well recognized, and certainly the rations of intoxicating liquors issued daily to the men did not diminish but rather increased the craving for strong drink. Thus, one gallon of beer was allowed daily to every person serving on board ship on the Home Station when in harbour or during a short period after leaving port, as it could not be conveniently stowed or kept for any length of time at sea, when wine and spirits were more frequently used; half a pint of spirits, generally rum, was issued in the place of beer, when the latter was exhausted, to every person above the rating of boy. Before 1740 the spirit was taken neat, but in that year Admiral Vernon ordered it to be diluted with water when served out, and since his time the mixture has been called 'Grog'. The

ration of beer was superseded altogether in 1831, and wine in lieu of spirits was issued only on the Cape Station. A salutary change had been effected in 1825, when the daily ration of spirit was reduced to a quarter of a pint, and tea or coffee allowed instead; when this change was introduced it naturally caused dissatisfaction among some, but in a short time it was approved of and acted most beneficially, as cases of insubordination decreased.

To give a lad of eighteen half a pint of spirits daily, with the precepts and example of his seniors, was tantamount to teaching drunkenness, for if he abstained from the allowance of grog he was ridiculed as a milksop; on the other hand he was praised for his manly and seamanlike qualifications if he drank it with avidity! The quantity allowed produced unhealthy excitement, if not intoxication, under the influence of which he neglected duty or committed acts of insubordination, entailing punishment, followed sometimes by repentance and amendment, but often by further indulgence, procuring spirits beyond his allowance by every means in his power, becoming reckless and a confirmed drunkard, and finally a pest and a burden to the service (Wilson, 'Naval Hygiene').

The spirit ration was again reduced in 1850; the evening grog was done away with, as the cook of each mess was usually found more or less under the influence of liquor, and at the evening drill falls from aloft were often of common occurrence. Half a gill of rum was allowed at dinner-time; this is the present ration now, diluted with three parts of water.

The beneficial results of this reduction in the spirit ration are evident from the fewer cases of delirium tremens recorded in the statistical reports. The habitual daily consumption of such a large quantity of alcohol undoubtedly tended to deprave the moral status and to create a further craving for drink when on leave ashore, but 'scenes of riot and drunkenness, the men giving free course to their unrestrained instincts,' are happily of rare occurrence now, and the moral condition of the bluejacket has been brought about by no more potent factor than that of Temperance; instead of taking up their grog on board many men now receive 'Savings', or money in lieu of it, and the temperance habit leads them to observe a vastly improved conduct ashore. The establishment of 'Sailors' Homes', which originated with Miss Agnes Weston, and whose strenuous labours for the seaman's good have been so successful, is an inestimable boon to liberty men, providing them with a shelter when otherwise their

leave might have been misspent. These homes and the kindred societies have had a powerful influence against disease and the temptations of idleness.

That alcohol plays a very considerable rôle in the acquisition of venereal disease is unfortunately but too well known. Legrand made the apposite remark : ' On s'alcoolise devant le comptoir et l'on se syphilise derrière,' and a French naval medical officer, Dr. Brémaud, wrote : ' Le Bréton ne recherche pas la femme et ne s'expose à la contagion que lorsqu'il est sous l'influence de l'ivresse. La prophylaxie des maladies vénériennes se confond donc avec la prophylaxie de l'alcoolisme. Pour atteindre la syphilis, il faut viser l'alcool. Many English naval surgeons have expressed themselves in similar terms, yet there were some of the old school who still held that the old routine was the better ; for example, the following extract written in 1863 :—

In days when each individual had a gill of rum daily, and men sang those patriotic and bacchanalian ditties which the curious genius of Dibdin rendered popular, the love of liquor was ably expressed by ' the voice of song ', and deprivation must have been a severe punishment. Moreover, as the evening's allowance went to the cooks of messes, there was always a strong popular interest at work to return straying mortals to the stern paths of duty. The custom of the service likewise appears to have allowed the surgeon to give a little of that ' fortifier in re ' assistance by which many cases even in the present day would be much benefited. The songs of Dibdin, like the grog of the period, have passed away ! For men who sing ' Annie Laurie ' or ' The Last Rose of Summer ' the dew distilled from the clouds and the ships' boilers is a sufficient stimulus—they are too sentimental for the rough language and potations of a coarser, a more manly age (' Health of Navy,' 1863).

Education, which has done so much to improve the social condition of the community, has also performed its part in bettering that of the sailor. In olden days the bluejacket was unable, in many instances, to read or write, and pressed men belonging to the criminal class had no vestige of education before entry. About 1820 chaplains and schoolmasters were appointed to certain ships, and Bibles and prayer-books, and later on religious tracts, were issued gratuitously. In 1837 instructors were appointed for the elementary education of boys and others who required it, and in 1838, by Admiralty order, libraries were established in each ship for the use of the crew and placed under the charge of the schoolmaster. The passing of

the Education Acts, by which school attendance was made compulsory, was so far beneficial that better educated boys were entered and the general tone has been ameliorated.

With a better education has arisen an improved morale. Men no longer take a delight in committing excesses when on leave, but spend their time rationally in healthy recreation. The establishment of football and cricket clubs in each ship, and the interest which officers now take in the men's sports, have done a vast amount of good, and the exercise allowed to the men has almost completely dissipated the alcoholic tendency and its sequelae.

The encouragement of thrift amongst ship's companies is also of considerable significance. Naval Savings Banks were instituted by Act of Parliament in 1866, and their operation has been attended with most satisfactory results; the sum of money annually passing through these banks is now considerably over £200,000, which speaks well for the self-denial of the men, who doubtlessly in former days would have spent their pay in reckless dissipation. This spirit of thrift leads to thoughts of marriage, and it is found that a greater percentage of men at the present time are married than was the case heretofore; this condition must have a weighty influence against the contraction of disease, and is a point often noted by medical officers of the *dépôt-ships*, the crews of which are mostly composed of married men.

Hygiene, both individual and general, has made rapid strides in the navy since the beginning of the past century. Personal hygiene was practically non-existent with the seamen of the olden days; the virtues of cleanliness were little studied and less understood by them, and Sir Gilbert Blane remarks that soap was not seriously thought of until 1810, and that the supply of this article was too scanty even at the time when he wrote (1830). The amount of fresh water allowed for ablutions was ridiculously meagre; before 1796 it is difficult to say how the seaman performed them, and the water used by the men for personal washing was afterwards added to that employed to wash the decks. 'Each mess was permitted to have a certain portion of fresh water for personal and general washing purposes, and after it had been

so used it was again used for washing the lower deck, which, though of hard oak, retained the moisture for a long time.' Such was the routine on board the *St. Jean d'Acre* in 1860, and in 1862 the medical officer of the *Edgar* writes: 'Two tubs of fresh water are provided for the use of each mess of twenty-five to thirty-five men, who wash after their breakfast around their mess table; in doing this they spill and splash water on the deck, soapsuds and excretions remaining there.' What opportunities herein lay for the propagation and dissemination of disease! The old system allowed half an hour for breakfast, and consequently there was no time for washing properly, and the men became slovenly and discontented; this led to concealment of disease (perhaps even the man did not know he was infected), in the majority of cases by those men who did not want to lose the opportunity of going ashore on leave, hence the resulting increase and virulency of the syphilis about this period. Later on the time allowed for breakfast was increased to three-quarters of an hour. Nowadays there should be no excuse for uncleanness; no difficulty occurs from want of water, time, or locality for ablution; special wash-places are fitted in all ships for the men, and, in fact, it is an uncommon occurrence on board a man-of-war to see an habitually dirty person. That this is a great prophylactic against venereal disease is well understood; on this point Sir Gilbert Blane, as long ago as 1822, remarked: 'The mitigation of the venereal disease has arisen from superior habits of cleanliness and superior skill in the cure;' besides, the men themselves have become convinced that hygiene of the person is necessary for their well-being, and they now take pride in the smartness of their appearance on shore. The general demeanour has changed considerably for the better, the bluejacket is more careful in the selection of places of resort, and through the instructions of his superiors he has arrived at a certain knowledge of the direful effects of venereal disease. It is the *mauvais sujet* who will be found to furnish the most syphilis; the more contented the ship's company the smaller the sick-list.

The improvements in the general hygiene of the ship effected of late years have also been conducive to an improved morale

of the bluejacket : men often prefer to remain on board than to go ashore, especially in foreign ports ; the old types of ships, badly ventilated and damp between decks, ill lighted, cramped, and generally uncomfortable for the men, have been superseded by classes of vessels to which the science of modern hygiene has been applied with marked advancement ; there is more comfort in the men's messes and more space. A better system of victualing has been introduced within the past few years, which has given great satisfaction, and the meal-times have been arranged with a better regard to the men's requirements. The sanitary arrangements have also been greatly improved ; the vessel as a whole is cleaner and more salubrious.

All these conditions, it is hardly necessary to state, in some way or other affect the bluejacket, and their general import is to raise his moral tone. The more liberal treatment of the sailor, both as regards his leave and his general comfort, is a factor which cannot be overlooked and must be considered a most important matter in the prevention of venereal disease.

Infection with syphilis is not confined to visits to the shore ; although of comparatively rare occurrence in the present day, now and again a case is reported of the disease contracted on board. Contagion may be the result of using various articles previously contaminated by syphilitic persons, such as mess utensils, spoons, forks, drinking vessels, and such-like, but perhaps the most common means is by the pipe : a man, who may be attending for treatment, or not, for syphilitic ulceration of the mouth, during the smoking time is called away and asks a messmate to ' keep his pipe alight '. Another possible cause is the infection of one or more of the numerous voice-pipes by a syphilitic and the spread of the disease, also the use of infected band instruments.

The following case illustrates the danger of ' sky-larking ' with a syphilitic subject :—

E. I., aet. 22, presented himself at the sick bay of his ship, February 23, 1893. He had a sore on the outer aspect of the right forefinger, which he stated had resulted from his striking a man on the mouth and so wounding his finger against the

teeth. The occurrence had taken place three weeks previous to his appearance at the sick bay. The sore on the finger had healed and broken down again just before he reported himself. A non-suppurating bubo appeared at the inner margin of the deltoid. He was sent to hospital on March 9, and a week later, that is, six weeks after the receipt of the injury, he became covered with a syphilitic rash. The next case, for which no history as to source of contagion could be traced, is of interest.

A. E., aet. 24, admitted to sick-list October 16, 1905. For three weeks previous to this date he had been under treatment on attending list with an indolent ulcer on right little finger, semicircular in shape and about half the size of a halfpenny piece; the surface of the ulcer was depressed in the centre, which was occupied by a yellow wash-leather slough and surrounded by red, unhealthy-looking granulations. The ulcer was situated at the base of the nail over the terminal phalanx and on the dorsal aspect. A considerably enlarged and indurated epitrochlear gland was present, and the axillary glands were also enlarged. Patient stated that it started as a 'small pimple which broke' and formed an ulcer gradually increasing in size. No history could be traced as to source of contagion. No rash present. He was put on mercurial treatment. On October 23 a definite rash appeared upon the chest, back, and abdomen, which was maculo-papular in type and of a rose-red colour and disappearing on pressure. By November 13 the ulcer had quite healed and the rash had almost disappeared.

There is yet another means by which infection may be conveyed, viz. by tattooing. It is well known that sailors have a great propensity for this kind of decoration on various parts of the body, and not a few instances have been reported where the poison of syphilis has been communicated to a healthy man during the operation. The tattooer's art is usually well displayed on the persons of men who have served on the China Station, and it is brought to a high degree of beauty in Japan. Considering that syphilis has always been very prevalent on the China Station, it is not at all surprising to hear of cases that have been infected by tattooing. In the 'Statistical Report of the Health of the

Navy for 1903', Staff-Surgeon Finch, R.N., describes a case which is worth reporting *in extenso*:—

'R. E. C., a stoker in the Royal Navy, came to the sick bay, January 5, complaining of a rash on his body and of soreness of throat, stating that he had only noticed these symptoms for a few days, but from the appearance of the rash there can be no doubt that it was older than this and that he had probably overlooked it. On examination he was found to have a copious eruption on his chest, abdomen, back and arms, the colour, symmetry, distribution, &c., of which at once suggested syphilis, and his tonsils and fauces were congested, with a shallow ulcer on each tonsil, the appearance of the throat being also strongly suggestive of syphilis. He had recently suffered frequently from severe headaches. There was no entry of syphilis on his medical history sheet and he had never to his knowledge suffered from this disease, nor were there any signs of a chancre having been situated on the penis. The patient himself, however, drew my attention to the fact that there was under the skin of the left forearm, about an inch below the elbow-joint and on the radial side, a hard lump with a small scab over it. He had noticed this for about two months, and it had apparently commenced as a hard papule and afterwards had a dry kind of sore over it; he had frequently squeezed it with the object of hastening its cure, but had not sought advice, thinking the condition of no importance. At the time when I first saw him there was a lump under the skin of the left forearm about the size of a large pea, very hard and abruptly circumscribed, with a small scab above, the skin around being hyperaemic and desquamating for about half an inch. Several axillary glands on this side were considerably enlarged and hard, but not matted together or tender, the axillary glands on the other side being practically normal. He had been tattooed on September 16 at Wei-hai-wei, and it was in the midst of a patch of tattooed skin that the sore was situated. Antisyphilitic remedies were ordered and his improvement was very marked and rapid; at the present time (February 10) the rash is still distinct but is no longer active in appearance, and there are no fresh spots. The throat is nearly

well and the hard lump in the forearm has almost disappeared. His hair is, however, coming out rather freely. On inquiry I found that he had been tattooed at the same place and at nearly the same time as another man who had also a sore of so highly suspicious an appearance on his forearm that he was ordered mercurial treatment, and in this case no secondary symptoms appeared to clear up a doubtful diagnosis.'

(Plate XVII at the end of this article is a photo of another case of tattoo-syphilis.)

CHAPTER XXXI

THE LOSS OF SERVICE FROM SYPHILIS IN THE NAVY

SYPHILIS has always been the cause of an enormous loss of efficiency in the navy, and, notwithstanding the improved methods of treatment that have been employed in later years, the annual loss of service, as represented by the days' sickness due to the disease, both on board ship and in hospital, by the number of men discharged from the service as being unfit for further duty, and finally by the deaths that have resulted from the malady, is still very considerable.

Taking the days' sickness from all causes and comparing the same for syphilis alone, for the last ten years in the service afloat, the sickness from syphilis has been rather more than one-sixth of that due to all causes (disease and injury). There has been a slight improvement noticeable in later years with regard to the average number of men sick daily: for the last ten years it has been 519·7 or 5·02 per 1,000 of force.

On board ship the treatment of these cases is not of much expense to the State, but it is very different when the hospital treatment is considered. In 1888 the Director-General of the Medical Department of the Navy, in giving evidence before the Select Committee of the House of Commons on the Navy Estimates, stated that the cost of medical treatment in hospital was about £5 11s. per head and for food £18 9s., making a total of £24 for each case; as in 1887 there were 2,686 venereal cases in Haslar Hospital, of which 1,648 were syphilitic, it can be calculated what an enormous expense this disease entailed there that year! (*vide* 'Lancet', May 26, 1888). For the last ten years the average number of days' sickness in hospital for syphilis annually has been 116,370, and assuming the daily cost of a hospital case to be five shillings (this is a reasonably low figure;

the daily cost of a patient in foreign hospitals is considerably more), the yearly cost for syphilis alone would amount to £29,000. (The average daily cost per patient at Haslar Hospital for 1906 and 1907 was 5s. 3·33d., so that, as no difference can be made between individual cases as regards their share of the cost of the establishment, it will be seen that the former estimate of 5s. per head is moderate.) This sum shows what this preventible disease costs the navy annually for hospital treatment alone.

The average number of days' sickness annually for syphilis on board ship for the same period has been 73,528; this represents a complete loss of service. The average duration of treatment per case was 31·3 days; in other words, every man who contracted syphilis and was treated on the sick-list was unfit for duty for one month. Men who are receiving the modern treatment of intramuscular injections are kept at duty, and consequently it is to be hoped that henceforth there will be less loss of service; in 1908 there were 14,110 days less sickness than in 1907, possibly from this reason.

Now with regard to the loss to the service from invaliding. Until 1900 there was no separate list of men finally invalided from the navy given in the reports; previous to that year, in the statistics of the total force, the column for invalids represented all men who had been invalided home from foreign stations as well as those who had been finally discharged from the service as unfit. As many men after invaliding from abroad are fit for duty again after hospital treatment at home, an erroneous idea of the loss from invaliding was conveyed; to remedy this, a separate list was given from that year of men finally invalided from the service. Since 1900 there have been 869 finally invalided for syphilis, which gives an average ratio per 1,000 of force of 0·92 for the nine years.

The following table gives the numbers finally invalided each year since 1900, with ages and length of service (this table includes marines at head-quarters) :—

TABLE XVII
SHOWING NUMBERS INVALIDED FROM THE SERVICE FOR SYPHILIS, 1900-1908.

Year.	No. of invalids.	Ages.										Length of Service.											
		Under 16.	Under 17.	Under 18.	Under 19.	Under 20.	Under 21.	Under 22.	Under 23.	Under 24.	Under 25.	25 to 35.	35 to 45.	45 and over.	Under 1 year.	Under 2 years.	Under 3 years.	Under 4 years.	Under 5 years.	5 to 10 years.	10 to 15 years.	15 to 20 years.	20 years and upwards.
1900	109	—	1	3	3	5	14	18	14	13	6	30	1	1	9	7	19	12	15	33	9	4	1
1901	107	1	2	2	4	8	6	18	15	8	10	27	4	2	7	8	14	15	37	8	3	3	3
1902	100	1	1	—	4	4	8	16	12	11	11	29	3	—	2	7	11	11	48	7	1	—	—
1903	56	—	—	—	—	3	3	6	4	6	9	23	2	—	2	2	5	3	6	29	7	2	—
1904	70	—	—	—	—	3	3	4	8	9	3	7	29	4	—	5	5	5	6	31	8	4	1
1905	78	—	1	—	2	3	12	3	6	10	13	25	2	1	1	4	7	9	14	30	9	3	1
1906	86	—	—	—	3	7	4	9	12	9	6	33	3	—	—	5	12	9	7	35	13	4	1
1907	169	—	—	—	2	14	13	15	25	20	18	59	3	—	5	11	10	21	23	72	23	2	2
1908	94	—	—	—	4	3	6	4	12	14	6	37	8	—	2	6	7	6	5	44	16	5	3
Totals	869	2	5	5	25	50	70	97	109	94	86	292	30	4	33	55	90	91	101	359	100	28	12

From this table it will be noticed that the majority of men invalided were under twenty-five years of age, many even under twenty-one—157 out of a total of 869, or 18 per cent.

The causes for which 86 cases were invalided in 1906 were :—

Syphilitic disease of brain	20
Obstinate ulceration of larynx and adjacent parts	20
Cachexia	11
Late secondary ulceration, rupia, &c.	10
Necrosis of palate and nasal bones	8
Syphilitic disease of eye, iritis, choroiditis, &c.	7
Syphilitic disease of ear, deafness	4
Syphilitic disease of joints	3
Syphilitic disease of bone	2
Syphilitic sarcocele (patient refused operation)	1
Total	86

Seventy of these invalids were men belonging to ships on the Home Station, the remainder were men who had been invalided abroad and finally invalided on resurvey.

During the past fifty-three years (i. e. since 1856) there have been 124 deaths from syphilis ; of this number 4 were returned as being due to primary syphilis—three of these were of the phagedenic type, 1 at Bombay in 1866 (*vide* East Indian Station), another in 1872, the sore having been contracted at Gibraltar, and the third in 1888 on the North American and West Indian Station in the person of a coloured seaman. As obstinate and intractable cases of syphilis after treatment in hospital for varying periods are invalided from the service, the death-rate from the disease appears small ; the average ratio for the past ten years till 1908 was 0·04 per 1,000.

It may not be out of place here to mention the close connexion of syphilis with tabes and general paralysis of the insane. In the Lumleian Lectures for 1906, Professor Ferrier quoted statistics which tended to show that both these diseases were of a syphilitic origin, particularly tabes. Fournier, also a firm believer in the syphilitic hypothesis, states that general paralysis usually occurs ten years after the appearance of the chancre ; the earlier symptoms of the disease in these cases are mild in character and no nervous or mental phenomena are present, then follows

a period during which the specific virus shows no action, and finally a later period in which there is severe disturbance characterized by grave nervous and mental symptoms. As the specific paralysis in diphtheria usually develops as a sequela in mild cases, so in those cases of syphilis where the earlier symptoms have been slight and often unnoticed, the late manifestations of the disease are those which attack the nervous system.

The rate of invaliding from the navy on account of nervous and mental diseases for the past nine years has been a fairly steady one, as the following table shows :—

TABLE XVIII

Year.	Total number of Cases.		Number in-validated.		Cases of General Paralysis of Insane received at Yarmouth.
	Nervous.	Mental.	Nervous.	Mental.	
1900	867	147	209	74	8 cases of G.P.I. out of a total of 14
1901	846	140	162	74	9 " " " " 16
1902	881	155	174	113	13 " " " " 16
1903	932	128	166	108	15 " " " " 24
1904	934	131	168	118	17 " " " " 28
1905	822	91	157	99	7 " " " " 17
1906	838	66	222	69	16 " " " " 24
1907	807	42	238	44	16 " " " " 23
1908	803	59	216	72	15 " " " " 30
Totals	7,730	959	1,712	771	116 " " " " 192

The figures for locomotor ataxia cannot be given, but from the above table it can be observed that, if syphilis is the essential cause of general paralysis of the insane, this disease enters largely into the statistics of insanity in the navy ; about three-fifths of the total number of cases of insanity received into the Royal Naval Asylum at Yarmouth have been patients affected with *dementia paralytica*, and this does not represent the total amount of insanity in the service as many cases are sent to other asylums or to the care of their friends.

With regard to syphilitic affections of the nervous system, these are usually met with at or before middle life, and Buzzard (' Clinical Aspects of Syphilitic Nervous Affections ') writes : ' Putting aside cases of injury, hemiplegia or paraplegia occurring in a person between 25 and 45 years of age, which is not associated with Bright's disease nor due to embolism (from disease of the

cardiac valves), is, in at least nineteen cases out of twenty, the result of syphilis.' Considering the comparatively large number of men finally discharged from the navy every year on account of nervous affections, it may confidently be assumed that in many cases the original cause of such was syphilis. Take epilepsy, for instance: in one year, 1906, seventy-five men were finally invalided for this affection. In many cases the age of the patient was just above 20. It has been stated that epileptic convulsions due to syphilis very rarely occur in patients under 20 years of age, and that they generally set in some time after that year, whereas genuine epilepsy with no syphilitic history in a large proportion of cases happens between the ages of 10 and 20. How many of the above seventy-five cases could be attributed to syphilis? On examining the medical history sheets of fifty men who had been finally invalided on account of epilepsy, a clear history of syphilis was discovered in twelve cases.

Again, of late years there has been a considerable number of men invalided for neurasthenia, and with this complaint the same question might be raised, to what extent does syphilis have to be taken into account for its production? There is no doubt that it is a powerful factor. The high pressure at which work is now carried on in the navy and the increased amount of brain exertion that is called for in these strenuous times, not forgetting the almost total absence of quiet from a modern man-of-war,—these conditions acting on a syphilitic subject tend to cause a serious nervous breakdown, eventually leading to invaliding. The following notes of a case illustrate the above remarks in a very decided manner:—

X. Y., aet. 35, contracted syphilis in 1898 in the West Indies; he submitted himself to a course of mercurial treatment for two years, during which time the secondary symptoms which had supervened, rash, sore throat, and some ulceration of the fauces, completely disappeared, and he considered himself cured of the disease. Towards the end of 1906 he went to the East Indian Station, where the excessive heat began to act injuriously on his somewhat weakened constitution (it is a well-known fact that persons who have suffered from syphilis are more liable to be

affected by heat than others), and he eventually had a complete nervous breakdown, characterized by insomnia, vertigo, and headache, and occasional symptoms of mental aberration. He was invalided to England in 1907, and after a complete rest of six months he was again found fit for duty, but the nervous symptoms had not entirely disappeared and his speech was slower than formerly, with fibrillar twitching of the tongue, and there was a progressive loss in weight. In another four months there was a further collapse ; this time, together with the former symptoms, there were delusionary ideas, and a specialist was consulted who diagnosed the case as general paralysis of the insane.

In this case there is no shadow of a doubt that the cause was syphilis aggravated by climatic and other incidental influences.

The supervention of an attack of malaria in a patient who has, or has lately recovered from, syphilis is in some cases decidedly grave and generally leads to invaliding. The debilitating effect of the fever appears to increase the toxic action of the syphilitic virus. The following case illustrates the combination of malaria and syphilis :—

A. D. contracted syphilis in 1894, and after a lengthy course of mercurial treatment all active manifestations ceased. He went to the West Coast of Africa and suffered from malaria on two occasions ; on his return to England in 1904 he occasionally had relapses of this coast fever, and was sent to hospital in February 1905 on account of an attack of fever. He remained in hospital five weeks, and then proceeded on sick leave ; convalescence was very slow, and in May 1905 he was still unfit for service and was granted a further period of sick leave. Towards the end of May he had an attack of cerebral syphilis with aphasia and diplopia and loss of power in the right side. Under specific treatment some improvement in his condition took place, and in September it was recorded that speech was thick, there was some diplopia, and he had a tendency to walk to the left ; mind was clear ; pupils normal, Romberg's sign absent, patellar reflexes were well marked, the right one more so than the left. Memory was good. A slight roseolar rash was present on limbs and back. Patient was being treated by inunction of mercury.

In December the report was less favourable; the speech had become slower and more indistinct since September, and the memory had considerably failed; the vision of the right eye was not so good, and there was a marked deterioration of the general health. He was in about the same condition three months later, but in April 1906 his mind became affected, delusions appeared, and he was removed to an asylum and eventually transferred to the Royal Naval Hospital, Yarmouth, in December, his condition on his admission there being considered to be the early stage of general paralysis.

Both these cases proved fatal.

In the following cases the complication of remittent fever with existing syphilis intensified the malignancy of the latter disease. They occurred in the practice of Fleet-Surgeon Bassett-Smith, who has kindly forwarded the notes.

1. W. T., aet. 36, contracted syphilis at Bombay the end of May 1896. The sore soon healed, but an old indurated bubo in the left groin, the result of disease contracted in England, re-inflamed and broke down. He had been on the sick-list from May 11 to May 22 with an attack of remittent fever. The bubo was freely laid open and gradually healed, and improvement was maintained until June 26, when a pustular eruption appeared on the face and spread over the body and limbs. The bubo broke down again on July 2 and had to be incised freely. On July 5 there was a relapse of the remittent fever, the temperature varying between 99° and 102.4° . The eruption began to disappear on July 15, leaving small pits on the face and arms. As neither the bubo would close well nor the fever abate, the patient becoming very anaemic and cachectic, he was sent to hospital for treatment. The fever ran a very protracted course and on October 8 he was invalided home. This case was particularly interesting as an eruption occurred which simulated true small-pox and was difficult to diagnose; it was semi-confluent and left slight pitting, but the rash came out before the fever and lasted longer than variola; moreover it disappeared under antisyphilitic treatment; it is also noteworthy that the man had actually been in bed for over a month before its appearance. This

man was finally invalided from the navy in 1897 for secondary syphilis.

2. J. M., aet. 31, put on the sick-list March 26, 1896, with symptoms of remittent fever. He also had glandular enlargements in both groins, the result of an attack of syphilis in January; these, however, did not suppurate yet increased in size. As no improvement in his condition took place, but on the contrary he became very cachectic, he was discharged to hospital at Bombay on April 10. The fever did not abate, and on April 20 a secondary pustular eruption came out on the face and limbs and trunk which became rupial in character. The throat was affected and deep ulcers appeared about the fauces, the nose also became attacked. The patient had occasional fits of despondency and periodical pains in his head, which were worse at night. The eruption began to disappear the first week in June, but the fever continued, and the general health became so bad that it was necessary to invalid him to England to preserve his life. Finally invalided in 1897.

3. R. S., aet. 21, put on the sick-list November 12, 1896, for a suppurating gummatous ulcer over the sternal end of the right clavicle; the edges were deeply undermined and the surrounding tissues much indurated. He had only lately arrived at Bombay from England and had been under treatment on the passage out. His general condition was very bad; the ulcerating surface extended deeply into the neck. The condition did not improve at all, and a slight attack of remittent fever occurring he was sent to hospital. No further improvement taking place he was invalided home from the station.

Fleet-Surgeon Bassett-Smith remarks that these were the worst cases of syphilis that he saw, and that the combination of remittent fever no doubt intensified the severity of the disease.

TABLE XIX

ILLUSTRATING LOSS OF SERVICE FROM 1859 TO 1908

<i>Year.</i>	<i>Force.</i>	<i>Days' sickness.</i>	<i>Average number sick per diem.</i>	<i>Sick daily per mille.</i>	<i>Invalids.</i>	<i>Per mille.</i>	<i>Deaths.</i>	<i>Per mille.</i>
1859	52,825	134,468	368.4	7.0	61	1.2	5	.1
1860	64,025	149,777	410.3	6.4	80	1.2	1	—
1861	62,485	181,423	497.0	7.9	78	1.2	1	—
1862	58,870	162,983	446.5	7.5	79	2.3	2	—
1863	54,090	155,558	426.1	7.8	102	1.8	—	—
1864	53,000	168,120	460.6	8.6	101	1.9	1	—
1865	51,210	170,828	468.0	9.1	130	2.5	—	—
1866	49,475	133,973	367.0	7.4	93	1.87	4	—
1867	51,000	132,447	362.8	7.0	70	1.3	—	—
1868	51,220	129,473	354.6	6.8	97	1.8	2	—
1869	48,820	115,557	316.5	6.3	87	1.7	1	—
1870	46,710	97,558	267.2	5.6	101	2.1	1	—
1871	47,460	93,768	256.8	5.3	62	1.2	1	—
1872	46,830	108,602	297.5	6.3	79	1.5	2	—
1873	45,440	103,134	282.5	6.1	90	1.9	1	—
1874	44,530	98,995	271.1	6.0	75	1.6	—	—
1875	44,360	86,505	236.9	5.2	64	1.4	2	—
1876	45,010	77,706	212.3	4.71	52	1.15	—	—
1877	44,940	79,228	217.06	4.82	69	1.52	1	.02
1878	46,400	82,357	225.62	4.85	62	1.32	—	—
1879	44,745	91,427	250.47	5.59	63	1.39	1	.02
1880	44,770	98,351	267.8	6.0	61	1.35	1	.02
1881	44,400	102,024	279.5	6.28	81	1.81	1	.02
1882	43,475	91,195	249.84	5.74	76	1.79	—	—
1883	43,350	115,888	316.49	7.31	155	3.54	—	—
1884	43,000	127,648	348.75	8.1	120	2.78	—	—
1885	46,670	112,147	307.24	6.58	80	1.7	—	—
1886	46,770	114,161	312.76	6.68	89	1.9	—	—
1887	48,410	133,084	364.6	7.52	95	1.96	1	.02
1888	50,060	135,791	371.0	7.4	87	1.73	3	.04
1889	50,790	150,033	411.04	8.08	107	1.84	3	.02
1890	53,350	153,775	421.29	7.88	109	2.04	2	.03
1891	55,670	150,064	411.12	7.38	118	2.11	4	.07
1892	58,330	155,413	424.61	7.27	110	1.88	7	.12
1893	60,120	165,880	454.46	7.55	136	2.26	5	.08
1894	64,840	177,418	486.07	7.49	124	1.91	2	.03
1895	67,960	173,720	475.93	6.99	119	1.75	4	.05
1896	72,620	191,773	523.96	7.2	121	1.66	4	.05
1897	80,540	197,743	541.76	6.72	161	1.99	9	.11
1898	82,830	193,906	531.24	6.4	154	1.85	6	.07
1899	89,180	178,725	489.65	5.48	140	1.56	4	.04
1900	95,830	173,923	476.5	4.97	158	1.64	3	.03
1901	98,410	180,016	493.19	5.01	165	1.67	4	.04
1902	99,609	176,416	483.33	4.84	167	1.67	2	.02
1903	103,100	195,465	535.51	5.19	95	.92	2	.01
1904	110,570	208,247	568.97	5.13	112	1.01	10	.09
1905	111,020	194,621	533.19	4.79	134	1.2	3	.02
1906	108,190	196,048	537.1	4.94	186	1.71	4	.03
1907	108,170	203,818	558.38	5.12	163	1.49	6	.05
1908	109,210	189,708	518.32	4.74	89	.81	6	.05

CHAPTER XXXII

TYPES OF THE DISEASE IN THE NAVY

REFERENCE has been made to journals of medical officers, as reported in the official ' Health of the Navy ' for the several years, and extracts therefrom have been quoted which illustrated the various types the disease then assumed.

It is undeniable that the syphilis of fifty years ago was a much more serious complaint in the navy than it is at present, and still more so was it at an earlier period of which unfortunately there are no records. Thanks to the enormous strides towards efficiency that sanitary science has made and the vast advancement in the methods by which the disease is treated, it may be confidently hoped that there will be no return to its pristine virulence. Whether, on account of the great prevalence of the malady before the adoption of preventive measures in this country, a syphilization of the community has been effected, as many writers have declared to be the case, so that an acquired immunization against the disease exists to a certain extent, or whether this factor acting in conjunction with hygienic progress produces a much milder form, it is a certain fact that cases of syphilis resembling those described by medical officers of forty or fifty years since are very rarely reported in the navy nowadays. Occasionally a severe type is notified where the syphilitic virus may be said to have been deposited on virgin soil and to have operated with exceeding rapidity, but such an example is uncommon.

The subject of partial immunization is a highly interesting one. The majority of recruits for the navy formerly came from country (i. e. not metropolitan) districts ; at the present day most of the material from which they are drawn is no longer rural but urban, on account of the migration of the class to the towns, in which there exist greater temptations and more facilities for

contracting the disease—and syphilization. The oft-repeated expression 'Civilization is syphilization' is only too true—witness the Sandwich Islands, where syphilis is reported to have been unknown before the arrival of Captain Cook's vessels, and also Vancouver's Island, where the natives became infected after the foundation of the settlement.

Professors Metchnikoff and Roux have demonstrated that the syphilitic virus can be attenuated by repeated passages through monkeys of the Rhesus type, and that the period of incubation becomes gradually diminished as the series of passages proceeds, yet the virus continues to be of a genuine syphilitic character; and this fact is confirmed by the discovery of the *Spirochaete pallida* in the inoculated lesions, although, being much weakened, the disease is still reproduced. From the passage of the syphilitic taint from generation to generation several races have acquired a certain immunity. This is well marked in the natives of Central America, where syphilis is exceedingly prevalent among the aborigines but yet is of a very mild type. The primary lesion, according to several writers, and in particular Dr. Rothschuh of Aachen, who resided a considerable time in Nicaragua and made a study of the subject, is hardly to be distinguished from chancroid, the secondary phenomena are attenuated, and tertiary symptoms are rare; of the latter the affections of the central nervous system are singularly absent; hereditary syphilis in a mild form is very common. The inference of these conditions is the syphilization of the original Indian tribes, and from his extensive researches among the tribes of the Central American States Dr. Rothschuh comes to the conclusion (*Archiv für Schiffs- und Truppen-Hygiene*) that the more Indian blood there is in the population, the milder is the syphilis observed, the severity of the disease increasing proportionately with the admixture of white blood. Consequently the half-breeds of Indians and Spaniards showed the worse forms. This is practically identical with the deductions made by naval surgeons on the Pacific Station. Syphilis was described as being extensively prevalent in Mexico, where there was an almost exclusively Indian population, yet the disease was not so severe as at Valparaiso,

where there was more blending of white races with the Indian. The statistics for the Pacific Station show a very high ratio. Again, the disease on the China Station has always been prevalent among the crews; in China, and also in Japan, observers have noticed a more or less general syphilization of the people; also in the Arabs of Zanzibar and the East Coast of Africa. The question as to the place of origin of syphilis has always been a debatable point; the New World, that is to say Central America, has lately found several partisans, particularly German, but whether it was imported to that continent from China, which was possible, is still a subject of controversy. However mild the type of the disease is in a certain race, it would appear to be only so for that race, as it certainly may be propagated in an intense form of severity in relations with another; for example, the European with the Asiatic or Central American. The statistics of the China and Pacific Stations illustrate this fact.

From the reports of medical officers serving in ships on the Home Station before the Contagious Diseases Acts were brought into operation, it would seem that the type of disease commonly met with was particularly severe. Every variety of sore was observed and mixed chancres were especially frequent; the phagedenic form was also not uncommon. An old opinion was prevalent about this time that the suppurating bubo conferred an immunity from constitutional syphilis, although under unusual causes of irritation—for example, work aloft, long marches, &c.—true syphilitic enlargement of the glands sometimes resulted in inflammation and suppuration; yet as a rule the suppurating bubo was held, and rightly so, to be the sequel of the non-infecting chancre. There was a good deal of confusion in the nomenclature of the disease until the term chancroid was applied to non-infecting sores, the term syphilis being given to all forms of chancres whether followed by secondary symptoms or not; it is only since 1905 that this change of nomenclature has been made in the statistical returns.

In 1863 the surgeon of the *Edgar* makes some observations with regard to the secondary phenomena then noticed, and he

remarks that tubercular and papular eruptions were the most common next to roseola :—

Pustular syphilis I find the most troublesome and worst forms of the disease; ecthyma, rupia, and syphilitic acne are frequent. . . . There are, I believe, many cases of mild constitutional syphilis in which the disease will wear itself out and disappear in two or three years, while there are others in which the disease seems to exert its baneful virulence with tenfold vigour, and to resist almost all forms of treatment. Relapses take place year after year, the disease and the impaired constitution seem to act and react on each other until finally the internal organs become affected with syphilitic deposit, and 'the patient dies, worn out by constitutional syphilis' ('Health of Navy,' 1863).

He further notes that the ratio of soft sores to indurated chancres in this year was three to one. Rheumatism was a very frequent sequela of syphilis at this time and a great cause for invaliding in syphilitic patients; it was more often present as a complication of the disease on foreign stations, particularly the Pacific. This station was notorious about the early sixties for the frequency and obstinacy of the rheumatism with syphilis; in fact, it was stated to be the most common form in which constitutional syphilis was developed in that climate. In many instances the cases were returned under the heading 'Rheumatism', thus giving the idea of less syphilis than was actually the case. Tertiary symptoms were very common. It was not unusual for men to be under treatment on board ship for gummata in various regions of the body; rupial ulcers were also common. Late tertiary syphilis is not often met with at present owing to the early invaliding of men affected with syphilis, and there is not that concealment of disease that formerly existed; moreover, the treatment is more efficient and systematic.

Some very interesting notes on the types of syphilis met with on the China Station in 1864 were made by the surgeon of the *Euryalus* :—

Independently of simple excoriations and small circular sores with a greyish surface and without induration, which never infected the system, were :—

1. The bubo which could be traced to originate neither from a urethral discharge nor from any kind of sore, and which was followed by the constitutional form of the disease.

2. There were one or two cases in which the constitutional form of the disease followed a simple urethral discharge.

3. There were cases of an indurated cicatrix, which appeared on the site of

a simple abrasion or an excoriated sore which had healed without attracting the notice of the patient.

4. There were cases of apparently simple sores on the corona, which, after healing without difficulty, would be followed by the exudation of plastic materials on the prepuce, or, as in one case, at the root of the penis, or in the groin itself.

5. There were the true Hunterian sores, shaped like buttons, and with indurated bases. This variety was rare.

6. There were the phagedenic chancres; viz. (a) the phagedenic chancre without any sloughing, an eroding sore eating away the glans as a whole; (b) the phagedenic chancre with the white sloughing surface, which was common; (c) no case of a phagedenic chancre with a black slough was seen on this ship, although I have seen one or two cases at Yokohama.

7. The creeping chancre was also common. It usually appeared on the body of the penis in the form of pimples, which passed on to pustules, and then formed into small sores, which coalesced until, in some cases at least, the whole body of the penis or the greater part of it became a large sloughy-looking ulcer, which would soon assume a raw, glazed appearance, with a great tendency to spread.

The secondary manifestations of the disease which came under my notice were the following: Cutaneous eruptions, such as the erythematous, papular, and pustular. . . . The commonest form of eruption that appeared was the roseolar; the papular eruption was also common; the pustular was seen less frequently. In some of the cases the eruption very much resembled the papular and vesicular stages of small-pox. . . . Iritis was a common affection; in these cases sometimes both eyes were implicated. . . . Syphilitic disease of the testicle followed in several of them; and two men tainted with syphilis were invalided with phthisis, one of whom died ('Health of Navy,' 1864).

The surgeon of the *Severn* gives a harrowing description of the disease as met with at Yokohama in 1865:—

The syphilitic disease proved of the most intractable character, much exceeding in virulence our previous experience of the same disease in the East Indies. The primary sore was not formidable, healing for the most part readily enough under treatment, and in none of our cases on board taking on a sloughing action; but all of them were followed by secondary symptoms of the most inveterate nature. The soft parts were first attacked, the skin being covered with copper-coloured and pustular eruptions, and occasionally with rupia; then ulceration of the throat and larynx took place, and this was followed by pseudo-rheumatic pains in the bones, periostitis, nodes, and caries. Emaciation progressed very rapidly, and the men from being strong and robust, were so worn out by the virulence of the disease, and the want of sleep from nocturnal pains, that in a short time they were reduced nearly to skeletons, and all had sooner or later to be sent home invalided ('Health of Navy,' 1865).

A gradual change in the severity of the disease was noticed after the Contagious Diseases Acts were applied to the various ports on this station. A milder form was observed, and the 'soft' sore became more common in the ratio of about six to one 'hard'; nevertheless, this type was frequently followed by secondary

TABLE XX
TABLE SHOWING NUMBER OF CASES OF SYPHILIS ADMITTED INTO HASLAR HOSPITAL IN 1870, AND THE VARIOUS
SECONDARY SYMPTOMS ENSUING

	Cases admitted.	Secondary Symptoms.												
		Ulcers of throat and fauces.	Roseola.	Papular.	Squa- mous.	Rupia.	Condy- loma.	Rheuma- tism.	Cor- neitis.	Bones.	Iritis.	Para- lysis.	Testis.	Phthisis.
Syphilis :														
Primary hard .	38	7	1	6	4	0	3	2	0	1	1	1	0	
Primary soft .	89	5	3	15	5	2	4	4	0	3	0	0	1	
Secondary . .	93	16	3	24	20	12	15	19	3	15	12	1	2	
Total . . .	220	28	7	45	29	14	22	25	3	19	13	2	3	
Per cent. . .		12.72	3.18	20.45	13.18	6.36	10.4	11.3	1.36	8.68	5.45	0.90	1.36	

From this table (taken from 'Health of Navy,' 1870) it will be observed that the so-called soft sore was very often attended with secondary sequelae.

symptoms, but these were of not such an intractable character as those formerly recorded. In combination with the hygienic measures impressed upon the community, the direct influence of the preventive legislation, and others directed to the men themselves, another great factor in the abatement of the virulence of the disease when acquired was the improvement in the methods for treating it. Notwithstanding the occasional variations in the prevalence (shown by the various charts), this change for the better has been generally maintained; the severer types of constitutional syphilis, such as rupia, which was so often reported in former years, are uncommon now, and when met with are the result of neglect.

In 1874 a fatal case was reported from Haslar Hospital. The patient had contracted primary disease in Japan two years previously; within three months forty-six ulcerations were scattered over the cutaneous surface, varying in size from the dimensions of half a crown to those of a shilling. On his return to England, invalided, in the summer of 1874, his legs were covered with cicatrices and the ulcerative action was transferred to the pharyngeal mucous membrane, a fatal issue occurring from the extension of the ulceration to deeper parts preventing the ingestion of sufficient nourishment and consequent asthenia. The worst cases received at this time in the home hospitals were invalids from the East, and there was a marked tendency to ulcerations of the mucous and cutaneous surfaces, a fact which also attracted the attention of early Portuguese writers on the syphilis of those regions, the disease when contracted in England then being of a much milder form. Of places on the East Indian Station Bombay and Zanzibar had a horrible reputation for the severity of syphilis, which was exceedingly prevalent there some thirty or forty years ago. A phagedenic type of sore was particularly common at Zanzibar, and was invariably followed by secondary symptoms, the eruption being either papular or tubercular. The primary lesion appeared as a black spot (*vide* East Indian Station); constitutional symptoms followed before the ulcer had healed, which caused great loss of tissue; in some instances the whole of the glans penis had been eaten away in

the destructive process, the veritable 'Black Lion' of earlier days, a type which was also met with at Valparaiso (*vide* Pacific Station).

The greater frequency of the 'soft' and 'mixed' sores in the tropics is attributable to the existence of more favourable conditions for the formation of pus, the want of cleanliness, and the native indolence of the people, who do not trouble themselves about such affections. As compared with temperate climates, in the tropics syphilis runs a more rapid course. The forms of the disease are not clinically different from those occurring in temperate regions, yet there are some which prevail, and there is a certain severity of the course which differs from that observed in the latter. As the mixed chancre is so prevalent the incubation period is somewhat shortened; the primary lesion usually appears in the third or fourth week after contagion, and a soft sore precedes the induration. Secondary symptoms occur mostly from nine to ten weeks after infection, and as a rule these are severe and accompanied with a rise of temperature during the period of the eruption, 102° to 104° in some cases. Generally a macular syphilide appears first, but also papular and, in severe cases, pustular eruptions are noted. A symptom, which has been constantly referred to, is the presence of pains in the bones, muscles, and joints, occurring during the secondary period, the ankle- and knee-joints being most usually affected. Headache always accompanies the period of the eruption. From many observations it appears that affections of the mucous membranes are exceptional. Loss of weight invariably occurs, and there is more mental depression as a rule than is observed in temperate climates and relapses are more frequent. When one takes into consideration the possible combination of malaria in patients affected with syphilis in the tropics, it will be understood that the latter disease will run a far more severe course than at home. Cases illustrating this combination have been given.

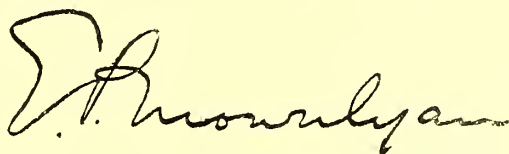
A handwritten signature in dark ink, appearing to read "J. H. Knowlton". The signature is fluid and cursive, with a large initial "J" and "H" that are connected to the rest of the name.

PLATE XVII



Photograph of a case of Tattoo Syphilis.

THE PRACTICAL TREATMENT AFLOAT
OF SYPHILIS IN THE ROYAL NAVY

BY

CHARLES K. BUSHE, M.D., B.A.

Staff-Surgeon, R.N.

CHAPTER XXXIII

INTRODUCTORY

OF late years the question of the treatment of syphilis in the Royal Navy has attracted far more attention than it used formerly to do, and the measures now directed against this potent factor in the production of inefficiency are far more effectual and comprehensive than they have ever been before.

Though the various methods of treatment still have their own advocates, the naval medical profession, as a body, may be said to be unanimous in its general attitude towards syphilis. The incidence of syphilis amongst the men of the navy is high, and this, together with the fact that the men are being constantly changed about from the care of one medical officer to that of another, has made it necessary to adopt definite measures to grapple with this disease, which is the cause of so much loss of service to the State.

In describing the general routine work which is now being carried out in the navy in regard to the treatment of syphilis, it will be necessary to divide the subject into certain sections, which will be considered separately. The following pages will be devoted to a description of those measures which have been adopted in relation to the prevention, diagnosis, detection, and treatment of the disease, all of which form a part of the routine work of the naval medical officer afloat.

Prevention. The question of prophylaxis in regard to syphilis is one of great interest and of enormous importance, considering the prominent part played by this disease in producing physical unfitness and deterioration. Though the question continues to attract much attention, still it seems extremely unlikely that the views of the moralist, the idealist, and the practical man will ever be brought into complete unanimity on this subject. In a medical work it would be impossible to enter fully into a question of so

great a magnitude, and anything like discussion on the subject will be avoided as far as possible.

It is with the practical side of the question that we have to deal—the measures that we can at the present time bring to bear against the acquisition and spread of syphilis amongst our sailors. In describing these measures it will be seen that the value of moral influence has by no means been forgotten or underestimated.

The occurrence of syphilis by extra-genital infection, or as the result of other than venereal contact, amongst the men of the Royal Navy is extremely uncommon; the disease is usually acquired as the result of sexual intercourse with the loose women that are still permitted to frequent our naval ports. In the absence of the control of prostitutes by legislative measures or other means the prevention of the spread of syphilis must be brought about, as far as possible, by the careful education of the bluejacket. The average sailor is remarkably ignorant on the subject of venereal diseases in general, and of syphilis in particular: his knowledge of the seriousness of this disease to the rest of the community, its remoter effects as well as its effects on himself, is practically nil.

With a view to remedy this state of affairs, a special course of lectures has recently been given at the principal naval ports in England, dealing with such subjects as personal hygiene, temperance, and venereal diseases, particular attention being given to the latter subject. The lecturer is a naval medical officer specially detailed for this duty; the lectures themselves are of a most excellent character, and cannot fail to do good amongst those who have been privileged to hear them.

In giving lectures of this kind to a collection of men such as comprises the ship's company of a man-of-war, composed as it is of men of different ages, from boys to elderly men, of married and unmarried men of moral and men of loose character, and men of different religious opinions, instruction on such a subject as prevention, in connexion with venereal disease, obviously requires to be carried out with extreme care and the greatest tact. There can be no doubt, however, that lectures of this kind,

delivered by experienced medical men, themselves naval officers, and thoroughly acquainted with the circumstances peculiar to life in the navy, cannot fail to go a long way towards improving existing conditions.

Dealing with the subject of syphilis, these lectures teach men the real nature of the disease, how it is acquired, how it may be recognized, the necessity for its proper treatment, and the need for the continuance of this treatment over long periods (even when the signs and symptoms of the disease have disappeared), together with the remoter effects of the disease and its relation to the rest of the community in general.

The subjects of continence and temperance are appropriately dealt with, and their relation to the prevention of the spread of venereal disease is explained. That abstinence from sexual intercourse is, of course, the only reliable prophylaxis, and the fact that incontinence is by no means necessary to health, cannot be too strongly urged and pointed out, both to those who may have given way to their sexual instincts and to those who have not.

The great value, too, of athletic pursuits must not be forgotten in connexion with keeping men in fit condition, and directing their thoughts from sexual subjects. At the same time it must not be overlooked that in the navy one has to deal with many hundreds of young adult men in the prime of sexual vigour, and exposed to those temptations to sexual indulgence which are so common in every naval port. It is among such a collection of men that some will always be found who will continue to indulge in promiscuous sexual intercourse in spite of the most eloquent appeals from both chaplains and doctors, and it is in such men that stronger and more practical measures must be brought to bear.

In the present state of public opinion in England it is impracticable to openly adopt such measures of prophylaxis in regard to venereal disease as now prevail in some foreign navies. In the German navy, notably, prophylaxis in regard to venereal disease is made a matter of discipline, and is enforced by the punishment of those men who, having become infected, had not made use of the preventive measures which were placed at their disposal. These compulsory prophylactic measures have been

the means of effecting a marked reduction in the number of cases of venereal disease occurring in the German navy.

The British mind, however, is perhaps not yet broad enough to see the advantages of such plain dealing with the subject of venereal disease. However, in spite of public opinion, there is much that can be done by the officers of the naval medical service towards preventing the spread of syphilis amongst the men who serve with them.

It is not only quite possible, but also highly desirable, that the men should be persuaded to do voluntarily what cannot be enforced by disciplinary measures. In men-of-war particularly, where the medical officers are in close touch with the ship's company, it is possible to put men who have exposed themselves to infection in a position to reduce the risk of their developing disease.

It would indeed be an act of immorality to deny to such men those measures of prophylaxis which science has placed at our disposal, and which may be the means of saving many men from developing a disease so serious as syphilis, the effects of which may be so far-reaching and disastrous.

Much can be done by a little plain-speaking in private to selected members of the ship's company, by encouraging them to use surgical cleanliness as far as possible, and by persuading them to report themselves for preventive treatment as soon as possible after exposure to infection. These men can, in turn, reasonably be expected to inform their companions of the means at their disposal for reducing the risk of acquiring venereal disease.

Against such a practical plan as has been proposed, it may be said that the existence of venereal disease acts as a check to those who wish to indulge in promiscuous sexual intercourse, and that to remove the fear of infection would tend to encourage previously continent men to indulge their sexual appetites, and thus favour the continuance of illicit intercourse and prostitution. Against this it may be argued that it is to be sincerely hoped that the majority of men who are moral in character, remain so from the promptings of some higher feelings than those of fear, and that those who abstain from illicit sexual intercourse, merely from fear of the consequences, may be left out of the question.

Further discussion on the moral aspect of this question is by the limits of this article forbidden, and it is not called for in a work of this nature, which aims at being essentially practical.

The measures for the practical application of prophylaxis in regard to syphilis, which are about to be described, are suggested in the hope that the spirit in which they are offered may not be misunderstood. They are intended in the best interests of the individual and of the service.

Practical prophylactic measures. Where a man has indulged in an intercourse with a woman of loose character and doubtful cleanliness, to aim only at prophylaxis in regard to syphilis would, of course, be incomplete, and so the preventive measures adopted should be of a general and inclusive character, directed against all the venereal diseases. The measures here set forth are simple and can be easily carried out, and although they are by no means certain in preventing the development of venereal disease, still they have met with success in a great number of cases and certainly tend to diminish the risk of the acquisition of disease.

Take the case of a man who presents himself for preventive treatment after exposure to infection, either the same night or, more probably, the next morning. The man is taken to the sick-bay lavatory and, under the supervision of a trained sick-berth steward, made to first of all wash his genitals thoroughly with soap and water. This accomplished, he is next instructed to inject a solution of protargol (4 to 10 per cent. in water) into the anterior urethra. This injection should be retained in the urethra for four minutes.

The next step is to make the man devote five minutes to carefully rubbing the penis with the calomel ointment recommended by Metchnikoff and Roux (vol. ii, p. 180). The rubbing should be thorough, and particular attention must be devoted to such parts as the glans penis and prepuce. The formula for calomel ointment for this purpose is as follows :—

R	Calomel	33 grains
	Vaseline, anhydrous . . .	10 grains
	Lanoline	67 grains
	Mix.	

In the case of syphilis, prevention may sometimes be brought about by making use of the ointment within eighteen hours after exposure to infection.

Certain prophylaxis cannot be guaranteed by the adoption of any of the foregoing measures, but in the light of recent experiments and in the present state of our knowledge, it seems reasonable to persist in such a scheme of prophylactic treatment as has been here recommended.

In addition to preventive treatment, and after such has been carried out, any lacerations or abrasions of the genitals should receive appropriate local curative treatment. There are, as well as the measures described, certain others which might well be adopted prior to exposure to infection, and though it is not judicious to disseminate such knowledge to every one, still in the case of incorrigible loose livers it rests with the medical officer to use his discretion as to the desirability of pointing out to such men some simple precautionary measures which can be made use of before actual exposure to infection. Such measures must be obvious to any medical man, and, therefore, do not call for any description here.

In the case of men who have already acquired syphilis, much can be done by instructing them individually as to the nature of the disease they are suffering from, its contagiousness and other important points, and in most ships and naval establishments suitable instructions worded in simple language are provided for the benefit of syphilitics. The following may be taken as an example :—

INFORMATION FOR PATIENTS SUFFERING FROM SYPHILIS.

1. The disease from which you are suffering is not merely a disease of your penis, throat, or skin, but is a disease of your whole body and blood.
2. Very serious consequences may result to your health if you neglect to carry out the treatment prescribed for you. You cannot be cured under two years' treatment at the least.
3. Remember that for at least one year from the date you first contracted the disease you are capable of infecting other people. It is criminal for you to have connexion with any woman during this period, and in any case as long as you are suffering from a sore throat, ulcers in the mouth, a sore on the penis, or spots and sores on the skin.
4. Remember that the disease can be contracted in other ways than by the

sexual act. You can infect people by kissing them. Never lend others your spoons, forks, cups, pipes, or razor.

5. Because you may seem healthy, and free from spots, ulcers, &c., that is no reason for you to neglect to continue your treatment.

6. Take pains to clean your teeth at least twice daily with a soft brush—a hard brush can be made soft by standing it for a little while in some water. Attention to your teeth is most important and necessary if you are taking mercury by the mouth, by inunction, or by injections. [It is also advisable to have all decayed teeth and stumps removed before commencing a mercurial course.]

7. Always report to the doctor any unusual symptoms you may notice about yourself as soon as they occur, particularly such as diarrhoea, soreness of the gums, or formation of too much spittle.

8. When you take mercury in any form you must be careful about what you eat. Green vegetables and fruit are prone to give you diarrhoea. Alcohol in excess is extremely bad for you, particularly in the shape of spirits. You need not become a total abstainer.

9. Remember that if you marry before you are cured, you may convey the disease to your wife, and your children will certainly inherit it, often with fatal results.

10. Do not be misled by the advertisements of quacks. Remember your doctor is treating you as he would treat himself if he had contracted the disease.

To introduce compulsory prophylactic measures into the navy would be most dangerous, leading as it might to concealment of disease, and the question of punishing all men who contract venereal disease, at best a narrow-minded one, need not be considered.

There are, however, instances where some punishment might be awarded with good results. Such cases would be those of men who, while still suffering from uncured syphilis, persist in indulging in sexual intercourse in spite of having been warned to the contrary. Such cases would, of course, only be brought to light accidentally, or by the men having acquired some fresh venereal affection, for which they would have to seek medical advice.

Possibly there are some medical officers whose views on the subject of prevention do not coincide with those which have just been expounded, and who may wish to dissociate themselves from the support of the foregoing scheme for the prevention of venereal disease, notably such a scheme as the use of preventive ointments, &c. It is therefore necessary to point out, in conclusion, that such a general scheme as has been described is merely a summary of the various means which we have at

our disposal for bringing about the prevention of syphilis among our sailors.

Let it be distinctly understood that the teaching of our sailors to practise continence, to be temperate, and to live a manly life, must be the basis of our prophylaxis : but, at the same time, allowance must be made for the fallibility of human nature. With conditions as they are ashore in our naval ports, where unlicensed prostitution is still permitted, and bearing in mind the artificial life led by those who follow the seafaring profession, it may be safely asserted that there is no other class of man more exposed to temptations towards self-indulgence than is the British sailor.

It is therefore justifiable to adopt any means in our power that hold out the hope of preventing the spread of venereal disease, particularly such a scourge as syphilis is to our navy.

CHAPTER XXXIV

THE DETECTION OF CASES OF SYPHILIS AMONGST SHIPS' COMPANIES

IN dealing with many hundreds of men, with conditions as they are in the navy, it is necessary to adopt some routine method for the detection amongst them of contagious diseases, of which syphilis ranks as one of the most important.

The cases of syphilis that are brought to notice are, for the most part, those of men who have voluntarily presented themselves for treatment as soon as they have discovered themselves to be suffering from disease.

Concealment of disease is punishable and cases of deliberate concealment are rare in the navy.

However, without some system for the detection of syphilis amongst ships' companies, it is certain that there would be a large number of cases of the disease which, either through ignorance or wilful deceit, would be kept concealed from the medical officers.

Some men when suffering from venereal disease are ashamed to consult their medical officers, or are afraid of having their leave and grog stopped ; such men, happily very few, usually help to swell the ranks of the victims of the quacks and charlatans that are ever ready to prey upon the credulous bluejacket.

The cases of syphilis that may require detection can be classified as follows :—

(a) Cases where the disease exists in an entirely untreated condition—usually of recent origin.

(b) Cases where the disease has been treated outside the service.

(c) Cases where the disease has been under treatment by service methods, but where, through the transference of the patient, the treatment has been discontinued.

The last class of case is only likely to occur where insufficient

measures have been taken to follow up the case in order to ensure continuous treatment, and where the patient is anxious to escape further treatment. There are many men who become wearied by a long course of continuous treatment and observation and who cannot be depended upon to apply for the continuance of their treatment when they join a new ship or dépôt.

A scheme for the detection of syphilis to be efficient must be comprehensive and must include all cases.

The existence of syphilis may be detected by the following means :—

1. Compulsory medical examinations.
2. Scrutiny of medical history sheets.

Medical examinations. This method of detection is, of course, of great value where objective signs of syphilis exist.

In the navy, all men have to submit to being medically examined both on leaving and on joining a ship or dépôt. The exigencies of the service are such that the transference of men from ship to ship is of frequent occurrence, so the bluejacket comes in for a great many medical inspections. At these inspections it is compulsory for all ratings below the rank of first-class petty officer to strip completely when passing before the medical officer.

In the case of first-class petty officers and higher ranks, it is usual for the medical officer to be satisfied with the men's word as to their being in a fit condition and free from disease, so these men are merely required to pass before the medical officer without stripping. The medical officer of course has the power to stop, question, and, if necessary, thoroughly examine any man whom he may suspect to be suffering from disease.

It is an excellent plan to make a routine practice of examining the mouths of all ranks and ratings, particularly of those men who are not required to strip.

This inspection of the mouth can always be performed for the ostensible purpose of ascertaining the condition of the teeth, while at the same time the presence or not of syphilitic lesions in the mouth can be noted and the necessity for further and more thorough examination can be determined.

It is right that men of the higher ranks should have the privilege of having their word taken as to their being free from disease, and not to do so would cause much resentment; at the same time men will be found who, from time to time, will abuse the privilege.

A routine examination of the mouth is in all cases undoubtedly of great help in detecting the presence of syphilis; moreover, it is a measure which can be rapidly and easily carried out without causing resentment.

Scrutiny of medical history sheets. Men who have been treated for syphilis in the service can be recognized by the record on their medical history sheets, which with the rest of the men's papers accompany them wherever they are drafted.

The question of the desirability of introducing special syphilis case sheets for use in the navy has received considerable attention for some time past, but up to the present such a procedure has not been considered necessary. Against the adoption of special syphilis history sheets is the question of the desirability of adding to the number of papers which have to follow men about.

It must be remembered that there are no writers borne on board a man-of-war for duties in connexion with the medical department, and none of the sick berth staff can be spared from their other duties for clerical work; the medical history sheets have therefore to pass through the general ship's office.

Even with the present system medical history sheets will sometimes go astray, and as they add to the number of loose official sheets they will also increase the amount of office work and risk of loss. In a modern man-of-war, where every available inch of space and every man are required for fighting purposes, it is necessary to limit the number of non-combatants as far as possible, so an increase of clerical staff is not practicable. The revised medical history sheet as it now stands is a sheet on which are shown the dates and names of the various diseases incurred, together with the number of days' sickness from each and the method of disposal. There is also a marginal column in which important notes can be entered. This column can be used to record notes about venereal diseases—particularly

syphilis, and it is sufficient for the purpose. The use of this margin, together with the other means of following up cases of syphilis that are in use in the navy, will be again alluded to later, when the question of treatment is discussed.

The necessity for bringing cases of syphilis to the notice of medical officers under whose care they may have to continue their treatment is obvious, as men will always be found who wish to escape further treatment, and in the absence of positive proofs will deny ever having suffered from the disease. It is a good plan to supplement the remarks on the medical history sheet by sending reference sheets direct from medical officer to medical officer, and, accompanying them, a duplicate of the man's page in the private syphilis register (*vide* p. 470) should also be sent.

Further allusions to following up cases will be found in the portion of this article dealing with the subject of treatment.

CHAPTER XXXV

DIAGNOSIS

THE diagnosis of syphilis is often extremely easy to arrive at, particularly where the manifestations present are typical, but there are a great many cases where the greatest difficulty will be found in establishing a positive diagnosis of the disease.

The naval medical officer may be called upon to make a diagnosis in cases where the evidences of disease are extremely slight, and it is only after considerable experience in dealing with syphilis that the true significance of each sign and symptom can be estimated with regard to its value in establishing a diagnosis of the presence of constitutional syphilis.

The disease may be brought to notice in any of its stages, whether it be characterized by primary, secondary, or tertiary manifestations, by the scars and stains of former lesions, or by the history of the case.

It is not unusual to be confronted with men who are suffering from the later manifestations of syphilis, the earlier stages of which have either been concealed or secretly treated, or for some other reason have escaped recognition.

Constitutional antisyphilitic treatment should be commenced immediately a diagnosis of syphilis has been arrived at, for there is no longer any doubt that the contagion of syphilis is extremely rapid in its involvement of the general system, and the disease becomes constitutional in a very short time from the date of exposure to infection; in most cases in a shorter time, in fact, than it takes for the earliest recognizable signs of the disease to develop.

The advance that has been made in regard to the serum diagnosis of syphilis and the experiments that are still proceeding, go to show that we have here a most valuable method of diagnosis, one that is likely to prove of great service in those cases

where we are anxious to commence specific treatment but are restrained from doing so by the uncertainty of the diagnosis.

The elaborate nature of this method of diagnosis, the necessity for laboratory equipment in its performance, men trained in laboratory work, and the many other difficulties attendant on the proper carrying out of this test have, up to the present, rendered it impossible to adopt this method of diagnosing syphilis on board ship, though the serum diagnosis of syphilis is practised in our principal naval hospitals. Accordingly, in the present article, which deals with the subject of syphilis afloat, the serum diagnosis of syphilis has been omitted; a full account of this method of diagnosis will be found in this volume (pp. 156 to 204).

The primary chancre when developed must be looked upon as the local sign of an already established constitutional infection, and therefore calls for constitutional treatment as well as local attention.

Theoretically, the course of the disease should be influenced more favourably the earlier the patient is brought under the influence of mercury, and so it is of the greatest importance to be able to arrive at a positive diagnosis as soon as possible, in order that antisyphilitic treatment may be commenced.

Whilst recognizing the fact that syphilis, even in the period of its primary manifestations, is a constitutional disease, it must not be forgotten that in practice the withholding of mercury in doubtful cases, where the development of further manifestations is necessary to clear up the diagnosis, does not seem to influence detrimentally the subsequent course of the disease, or detract from the likelihood of eventually bringing about a permanent cure.

It will be seen that the exhibition or withholding of mercury affords in some cases a valuable means in establishing a diagnosis.

Many great authorities, particularly on the Continent, are in favour of awaiting the development of early secondary signs in cases where the primary manifestations are not typical.

These observers teach that no harm is done by this delay in treatment, and that the clearing up of any doubt in the diagnosis is all-important to both the patient and the surgeon.

It is a pity that reliable statistics, enough to be of value,

are not to hand to prove, or disprove, this policy, and it would be interesting to note the connexion, if any, between the withholding of mercury constitutionally in the primary stage of syphilis and the development of tertiary lesions and the so-called 'parasymphilitic' affections.

In doubtful cases mercury is often given temporarily until the special manifestations under observation have cleared up, and many surgeons profess to be able to diagnose the specific or non-specific nature of the disease by the manner in which manifestations react to the drug.

The exhibition of mercury in cases where the diagnosis remains in doubt should, however, be the exception to the rule that mercury should be withheld, both constitutionally and locally, until we are certain that the disease we are dealing with really is syphilis.

Concerning the subject of diagnosis enough has been said with regard to the relative merits and demerits of the exhibition or withholding of mercury; further reference to the subject of when to commence mercurial treatment will be found in the section dealing particularly with the treatment of syphilis.

It is now necessary to discuss the value of the symptoms and objective signs of syphilis with regard to their influence in arriving at a diagnosis.

It must not be forgotten that a diagnosis of syphilis is at any time an unpleasant shock to a man, and is tantamount to passing a sentence upon him of a two years' course of tedious and troublesome treatment,—and that not without danger to the patient.

There are many points to be taken into consideration before determining upon whether a particular case is really one of syphilis or not, and cases are often found so dissimilar as to make it necessary that each should be judged upon its own merits.

In some patients a very few points will suffice to establish a diagnosis, whilst in others the diagnosis has to be built up after a most searching inquiry into signs, symptoms, and history, and there are many cases that remain in doubt until, perhaps, the development of some further manifestations establishes the diagnosis.

In most cases it will be found that attention to the following points will be sufficient to make a diagnosis :—

- (a) The history of the case.
- (b) The character and situation of the initial lesion when present.
- (c) The demonstration of the *Spirochaete pallida*.
- (d) The condition of the lymphatic glandular system, particular attention being devoted to the state of those glands likely to be first implicated by the lesion under consideration.
- (e) The general condition and state of health of the patient with regard to temperature, body-weight, state of the blood, and urine.
- (f) The condition of the skin and the nature and position of any cutaneous eruptions, lesions, scars, or stains that may be present.
- (g) The condition of the mucous membranes, especially that of the mouth.
- (h) The condition of the scalp.
- (i) The condition of the eyes.
- (j) The presence or absence of periosteal nodes, or softenings in connexion with those bones that can be most readily palpated, such as the shin-bones.

The man should be made to strip completely for the physical part of the examination, but, first of all, inquiry should be made into the *history* of the case.

The first part of the history to inquire into is that dealing with the date of exposure to infection, and the date when the first manifestation was noticed.

A reliable history, when such can be obtained, is of course of great value in forming a diagnosis, but unfortunately men do not always remember when they became exposed to a particular infection.

In the case of men who have been promiscuous in their intercourse too much weight should not be attached to their statements as to the dates of exposure to contagion.

In cases where particular symptoms or signs are suspected to be later manifestations of a former syphilitic infection, the past history of the case should be inquired into, and the *medical history sheets* should be inspected with a view to ascertaining

whether previous attacks of syphilis, or other venereal diseases, have been recorded.

In the absence of a previous record of disease the patient should be closely questioned as to the former existence of sores, urethral discharges, buboes, skin eruptions, sores of the mouth, tongue, and throat, iritis and alopecia.

In any case the presence of any sore on the genital organs should be an object of suspicion, as a possible point of entry for the contagion of syphilis, whether the lesion is the immediate result of the sexual act, or whether it develops after some interval of time.

A sore which does not develop for some weeks after exposure to infection affords strong presumptive evidence of the presence of syphilis.

Having obtained all the information possible from the history of the case, the next step is to proceed with the physical examination of the patient, for which he should be completely stripped.

The primary lesion. Here a differential diagnosis must be made between the true syphilitic hard chancre, the chancroid, simple abrasions, and herpes.

The *syphilitic chancre* is usually solitary, and may occur extra-genitally on any part of the body as well as on the genital organs.

The chancre is generally taken as representing the point at which the contagion of syphilis originally entered, and does not usually develop to a noticeable extent until some weeks after exposure to contagion. The most common site for a chancre to develop is in the posterior part of the groove surrounding the glans penis.

Sooner or later a variable amount of induration can be made out in the chancre, particularly at the base. In the case of extra-genital chancres the amount of induration varies considerably with the site of the sore, and in some instances it is almost absent.

Chancres in situations other than on the penis often give rise to more local inflammation and oedema, whilst their other characteristics are very much obscured.

The syphilitic chancre, if kept clean, usually shows little

tendency to ulcerate or inflame, and the characteristic accompanying involvement of the local lymphatic glands is usually free from septic implication.

The *chancroid* is a sore of variable nature and situation, having no definite period of incubation, but it is usual for such sores to develop in a few days after exposure to infection.

It must not be forgotten that chancroids are sometimes contracted at the same time that syphilis is acquired, that such cases usually run the course of a soft sore at first and develop later on the characteristics of syphilitic implication.

The chancroid is always an ulcer, and if untreated may spread.

Chancroids are often multiple, and opposing surfaces can be inoculated. The ulcer is associated with a profuse discharge, and when healed often leaves considerable scarring. The associated involvement of the neighbouring lymphatic glands is more often than not characterized by suppuration.

Induration is usually absent from a chancroid, but dirt, neglect, and the application of irritants may produce a degree of hardening difficult to distinguish from the induration due to syphilis.

Abrasions and *herpes* are distinguished by their benign character, and the readiness with which they disappear under cleanly and simple treatment.

In the case of herpes this disease usually appears at first as a crop of vesicles often preceded by itching, and irritation along the course of a nerve. The vesicles generally break down into little ulcers, which usually coalesce but heal readily. Syphilitic subjects are said to be liable to recurrent outbreaks of *herpes preputialis*, but this affection is common enough amongst those who have never had syphilis.

The demonstration of the Spirochaete pallida. The accredited specific organism of syphilis—the *Spirochaete pallida*—may be sought for in microscopic preparations of the juices obtained by scraping or incising a suspected chancre, or by puncturing and aspirating an infected gland.

The preparation and staining of specimens, and the recognition of the organism of syphilis when present, require considerable experience in this kind of work, and, for that reason, this

method of diagnosis is not always practicable in the service afloat.

A description of the technique employed will be found on pp. 139-56 of this volume. The presence of *Spirochaete pallida* may be regarded as positive evidence of the existence of syphilis, but failure to demonstrate the organism must not be taken as proof that syphilis is not present.

The lymphatic system. The lymphatic glands nearest to the lesion generally become implicated in about ten days from the appearance of the sore. The involvement of these glands in cases of syphilis is usually characteristic, being marked by freedom from much pain or inflammation. The glands themselves are usually a little enlarged, indurated and firm to the touch, and do not tend to coalesce with their fellows. Suppuration only occurs where some septic organisms have gained entrance. Besides the implication of the glands nearest to the sore there is generally an involvement of most of the glands of the body, which may present varying degrees of enlargement and induration and can be palpated in such situations as the cervical and axillary regions.

The general health of the patient. An important clue for diagnostic purposes in cases of doubtful sores can often be furnished by inquiry into the patient's general health. The temperature should be taken in the morning and evening, and the presence or not of anaemia and languor should be noted. A point of great importance to attend to is the taking of the *body-weight* from time to time. The presence of severe and unaccustomed headaches may also help in establishing a diagnosis. The *urine* should be examined in all cases of suspected syphilis, with a view to the detection of albumin, which, if present, may be of syphilitic or other origin. If albumin is present it is not of necessity a contra-indication to the exhibition of mercury, but this should be given cautiously, and in small doses, when, if the albuminuria clears up, it may be taken as having been of syphilitic origin.

The diagnostic points that have so far been described are chiefly associated with the primary stage of syphilis, in which it is often possible definitely to diagnose the disease.

The diagnosis, therefore, of syphilis before the secondary

manifestations have made their appearance depends upon the length of the period of incubation, the induration and general character of the lesion, the characteristic involvement of the lymphatic glands, the condition of the patient's general health during the period, and the microscopic demonstration of the organism of syphilis. No one of these foregoing points can be taken as sufficient evidence to establish a positive diagnosis, with the exception of the finding of the *Spirochaete pallida*, but several of them taken together will often furnish proof of the presence of syphilis. Many authorities can diagnose the disease from the induration of the sore and implication of the glands, or solely from the character of the sore. In examining a sore for induration the surgeon should always use rubber gloves or finger-stalls.

The condition of the skin. At medical inspections a cutaneous eruption is often the first noticeable sign that attracts the medical officer's attention to a particular case, and causes him to suspect the presence of syphilis.

Leaving out of the question those cases where there has been no primary sore, it is not infrequent to find, in the case of men who present themselves for treatment, that, through carelessness or ignorance, the primary sore has escaped recognition, and it is not until the appearance of an obvious skin eruption that the patient seeks medical advice.

For diagnostic purposes a cutaneous eruption alone is scarcely sufficient evidence upon which to form a positive opinion, and some other manifestation should be sought for to confirm the diagnosis.

Syphilitic eruptions may simulate the non-syphilitic rashes in appearance, and the non-syphilitic eruptions sometimes imitate the syphilides in the manner of their disposal as well as some of their other characters ; thus it is that acne, psoriasis, and scabies have before now been mistaken for syphilitic manifestations by the inexperienced.

The macular, roseolar, and papular types of eruption are those which are met with most frequently in syphilis, but the varieties of syphilitic skin manifestations are numerous, their characteristics varying according to the length of time they have

existed, and whether they have or have not been modified by previous treatment (see 'System', vol. v).

There are, however, certain characteristics which are common to most syphilides, which are as follows :—

(a) *Symmetrical disposition.* This symmetry is nearly always a feature of the early secondary rashes, but in the later secondary stages an asymmetrical type of eruption is often met with.

(b) *Predilection for certain situations.* The cutaneous manifestations of syphilis usually have a preference for certain parts of the body, and are commonly found on the sides, front, and back of the abdomen and chest. On the limbs, the flexor aspects are usually attacked, as also are often the soles of the feet, and palms of the hands. It is unusual to find the dorsal surfaces of the feet or hands attacked by syphilides. The base of the neck in front, the nape of the neck, the margin of the skull, and the forehead, are all common situations in which a syphilitic eruption may show itself.

(c) *Typical colour.* A syphilitic rash is generally more or less pigmented, and is usually described as being of a copper tint, or 'raw ham' appearance. In the early stages the rash often presents a variable depth of red colouring, and in some cases a copper-coloured staining is permanently left in the skin.

(d) *Absence of irritation.* Syphilides are very rarely associated with itching, irritation, or pain.

(e) *Shape.* The skin lesions in syphilis often take on definite shapes, of which the circular, crescentic, and serpiginous are the commonest.

(f) *Polymorphism.* It is common to find the syphilitic rash presenting mixed characteristics, and combining in one eruption several different forms of syphilides.

The condition of the mucous membranes. Lesions of the mucous membranes of the mouth and of the muco-cutaneous margin of the anus are commonly met with in secondary syphilis, and are usually readily recognizable. Primary sores are also sometimes to be found in these situations.

In examining the mouth for syphilitic lesions a tongue depressor or spatula should be used. A convenient form of depressor can be made out of a metal spoon, the handle of which should be

bent backwards at right angles to the bowl; the bowl can then be held in the hand, and the handle used to depress the tongue, the operator's hand being thus brought below the patient's chin, and so an uninterrupted view of the interior of the patient's mouth can be obtained.

Whatever form of depressor is used, there should be one kept specially for the use of syphilitic patients. The patient should first be made to open the mouth widely, and protrude and rotate the tongue slowly. The tongue should then be held down by the depressor, and the fauces, tonsils, and palate should be scrutinized. The depressor should be then carried slowly round the inner surfaces of the cheeks, separating them from the teeth.

Lastly, the patient should be asked to evert the upper and lower lips.

Mucous patches in the mouth are generally found on the mucous membrane of the cheeks, the sides and tip of the tongue, and on the tonsils and palate. A mucous patch is a whitish opaque spot which is neither raised nor depressed, and may be likened to the appearance produced by applying a drop of pure carbolic acid to a healthy mucous membrane. Besides mucous patches ulcers of various kinds are commonly seen on the tonsils, tongue, and inner aspect of the lips. Occurring on the tongue, these ulcers are commonly associated with friction against a jagged tooth or stump. Some of the ulcers met with, particularly on the roof of the mouth, and on the tongue, have the appearance of herpetic lesions.

To examine the muco-cutaneous margin of the anus the man should be made to bend down until his fingers nearly touch the ground, keeping the knees straight, and an attendant then separates the buttocks. The anus may be the seat of a primary sore, or of condylomata. In the case of a primary sore a positive diagnosis is not always easy to arrive at, as the lesion in this situation may not present the signs by which it is usually characterized in more common sites. Condylomata are, however, readily recognizable.

The condition of the scalp. Thinning of the hair, and baldness, may or may not be due to the effects of syphilis; indeed, the bluejacket under treatment for syphilis commonly attribute

this condition to the effects of mercury and not to the disease itself. Unless the hair follicles have been destroyed in patches by syphilitic ulceration, in which case permanent bald spots will result, there is little of diagnostic value to be gained from the condition of the scalp.

The condition of the eyes. The presence of syphilitic iritis is usually easily detected, and is characterized by circum-corneal injection, dullness in the colour of the iris, and irregularity of the pupil when dilated with atropine. Primary sores, and gummata, are rarely met with in connexion with the eyes and eyelids.

The presence of periosteal nodes, &c. The commonest situations to find syphilitic nodes are on such long bones as the tibia, clavicle, sternum, and where they may be felt by ordinary palpation.

The foregoing diagnostic points have been but briefly dealt with, for their nature and value are already well known to the naval medical officer, whose experience in regard to syphilis is generally very large. Almost unrivalled opportunities of becoming expert in the subject of syphilology are offered to naval medical officers, particularly to those who have any length of service to their credit, and to such advice may seem superfluous; but for those who have not yet encountered a sufficiency of cases to give them that confidence in diagnosis which is begotten of riper experience, the following remarks may not be out of place:—

Do not attach too much importance to the history as narrated by the bluejacket himself.

Do not diagnose syphilis positively on the strength of one manifestation alone, but search in all cases for confirmatory evidence, or await its development.

Do not, whilst awaiting the development of confirmatory evidence, use mercury locally or constitutionally, until you have thoroughly tried the effect of non-specific treatment, except in cases where the manifestation under consideration is in danger of involving important structures—such as the eye—or where it shows rapid destructive development, or is likely to produce disfigurement.

CHAPTER XXXVI

TREATMENT

IN dealing with the question of the treatment of syphilis the subjects of local and constitutional treatments will be separately described, each in its relation to the classical primary, secondary, and tertiary stages of the disease.

That mercury is the one great specific for syphilis may now be taken as an established fact, and as such it has been accepted for very many years by the naval medical profession.

Mercury alone, however, is often inadequate in clearing up some of the manifestations of syphilis, and so other drugs and other forms of treatment must be utilized in many cases.

It is to mercury alone, however, that we look to produce an ultimate cure, and other drugs and treatments must be looked upon only as auxiliaries suitable for clearing up special manifestations, but not for ridding the constitution of the syphilitic taint.

Amongst the drugs that can be employed constitutionally with beneficial results, in conjunction with the exhibition of mercury, or during the intervals in the treatment by mercury, the most important are the iodides and arsenic.

The benefit, too, of combining hygienic, tonic, and dietary treatment with the administration of mercury must not be forgotten, and every means should be adopted to get men who are undergoing a mercurial course into as fit a condition as possible.

When to begin the constitutional administration of mercury is no longer a doubtful question, as most authorities now agree that mercurial treatment should be commenced as soon as the presence of syphilis is positively diagnosed, regardless of what stage the disease may have arrived at. The old plan of treatment, in which local applications were used, sometimes without

internal treatment, in the primary stage, mercury was given internally in the secondary stage, and the iodides alone were relied upon to effect a cure in the tertiary stage, is now modified in so far that mercury is now given constitutionally in all the stages of syphilis. Constitutional treatment to be effectual should extend over a period of at least two years.

Local treatment during the primary stage. Here the form of treatment is regulated by whether the diagnosis of syphilis has been established or not.

In cases where a diagnosis of syphilis has not been yet arrived at, the treatment of the primary lesion consists in keeping the part as clean surgically as possible by the use of simple lotions and applications. The sore may be washed two or three times daily with boric lotion (1 in 40), or a weak solution of permanganate of potassium may be used. Between the washings, iodoform, or a mixture of iodoform and boric powder in equal parts, may be applied, or a weak boric ointment may be used. A piece of clean lint or gauze should be kept between the foreskin and the glans penis in the region of the sore, when it is in that situation. Where a diagnosis of syphilis has been established the local treatment should consist of washing with *lotio nigra*, in the strength of 4 or 5 grains of calomel to each ounce of lime-water; a piece of lint soaked in the same lotion may be kept applied to the sore. If a dry dressing is preferred, iodoform may be used, or a powder containing equal parts of calomel and boric acid, or calomel alone. Whatever form of treatment is adopted cleanliness should be insisted upon.

The surgical treatment of chancres by excision has not up to date warranted a continuance of this procedure, chiefly for the reason that it is not always possible to recognize the chancre in an early enough stage before the system has been impregnated with the syphilitic infection. The application, too, of caustics is not advisable, as they usually only serve to irritate the existing lesion, and in doubtful cases may give rise to misleading induration.

However, there are certain forms of chancroidal sores which, after the slough has been removed by fomentations, may be

benefited and checked by the application of pure carbolic acid on the end of a wooden match. The pain produced by the application of pure carbolic to an open sore very quickly passes off, as the acid is in itself of the nature of a local anaesthetic.

It is better to keep all cases of venereal sores on the sick-list until they are healed, as by doing so the tendency to the formation of troublesome buboes is diminished, and the risk of the spread of contagion to healthy persons decreased. In any case men suffering from sores or primary syphilis should have their leave stopped until the disease has ceased to be active (*vide* p. 495). Where buboes exist, rest in bed is usually necessary, and a pad of wool and a bandage should be firmly applied over the glands involved. In cases of great enlargement and hyperplasia of the glands, it may be necessary to excise them, and an operation will, of course, be required where the glands have broken down and suppurated. In the case of chancroids, and sores suspected of being of syphilitic origin, but where a diagnosis has not been positively made, special entries on the medical history sheets must be made when these cases are discharged to duty.

Such sores may be entered up as follows: 'Venereal sore, undetermined, continues under observation'; or, 'Chancroid, continues under observation'; the special features and situation of the lesions should also be briefly noted.

To be on the safe side it is advisable to compel all cases of venereal sores that have not been diagnosed as syphilitic, and that have been discharged to duty, to attend on a certain day, once a week, for inspection. At these inspections the site of the original sore, the skin of the body, the local lymphatic glands, and the interior of the mouth should be examined. These weekly inspections should be continued for a period of twelve weeks before the men can be discharged from observation and pronounced free from disease.

In the event of men who are undergoing weekly observation for syphilis being transferred from one ship to another, a reference sheet should be sent informing the next medical officer under whose care the men may come of the nature of their disease

and the necessity for their continuing under observation up to a certain date.

Extra-genital chancres may require other local treatment than that which has already been described ; in their case the nature of the treatment will be determined by the character and situation of the lesion and whether the diagnosis has or has not been determined upon.

Constitutional treatment during the primary stage. In the primary stage of syphilis the constitutional treatment practically resolves itself into the exhibition of mercury by some means.

Tonic treatment may also be indicated, but it will be found that most of the special symptoms of this period of the disease, such as anaemia, loss of weight, febrile temperature, &c., will all rapidly disappear as the patient becomes influenced by the constitutional administration of mercury.

The methods of administering mercury constitutionally have been described fully in connexion with the treatment of syphilis in general (vol. ii, pp. 260-307). As this volume, like the others in this System, is designed to be complete in itself, the author of this article has been requested to give an account of the treatment of syphilis in so far as the service *afloat* is concerned.

In the case of undiagnosed sores remaining under observation the constitutional treatment required is generally nil, but cases of anaemia will require some iron tonic, and perhaps a more generous diet.

Phagedenic sores are happily not commonly met with nowadays in the navy; such sores should be touched with crude chromic acid or scraped and touched with pure carbolic acid; they may then be dressed with fomentations, and later on with calomel powder, or it may be advisable in some cases to bring the patient under the influence of a general anaesthetic and then remove the sloughs.

Phagedaena is also often successfully treated by prolonged immersion in hot baths containing an antiseptic in solution, such as boric acid. These patients should be brought under the influence of mercury constitutionally as soon as possible.

Local treatment during the secondary stage. The eruptions

which may characterize the early secondary stage of syphilis rarely call for any topical applications, and the internal administration of mercury is expected to bring about the disappearance of these manifestations. There are, however, some forms of eruption which will be benefited by combining local with constitutional treatment—such are, particularly, rupial ulcerations and those scattered serpiginous, circular, or crescentic syphilides, which are sometimes met with in the later secondary stage, or occurring as the so-called ‘reminders’, and characterized by slightly raised ulcerating edges.

In the case of rupial lesions it may be necessary first to remove the crusts and discharge, by fomentations which can be wrung out of a boiling solution of 1 in 1,000 hydr. perchlor. The surfaces of the lesions can then be dressed with iodoform or calomel, or a diluted preparation of the ung. hydr. ammon. may be applied. In the case of the other cutaneous syphilides alluded to the same ointment may be applied, or iodoform; sulphur ointment often does good.

Another useful application for localised and superficial skin lesions is the emplastrum hydrargyri.

Condylomata should be dusted with calomel powder, or a mixture of equal parts of calomel and zinc oxide; these dusting powders should be washed off morning and evening with lotio nigra, and the condylomata then re-dressed. Exuberant condylomatous growths may require scraping, and the application of pure carbolic acid. The acid nitrate of mercury is recommended by some as a topical application, but the pain produced by this treatment seems out of proportion to the benefit derived by its use.

Iritis will require local treatment in the shape of the daily insertion of lamellae of atropine ($\frac{1}{200}$ grain of the hydrochloride of atropine) morning and evening, and an efficient eyeshade should be worn; at the same time the patient should be rapidly brought under the influence of mercury, preferably by inunction or injection.

Mucous patches and ulcerations of the mouth are greatly benefited by local treatment, and there are several local applications which

are of use. Silver nitrate can be used as an application for indolent ulcers and patches; the salt may be used in solution,—about 20 grains to each ounce of water—but the solid stick is preferable. Amongst other local applications that are recommended are chromic acid (10 per cent. solution), acid nitrate of mercury (B.P.), and copper sulphate. Of all the local applications suitable for syphilitic lesions, and there are some others that have not been mentioned, the one that is least made use of is copper sulphate, and yet in this salt we have what may almost be called a specific in the local treatment of the syphilitic lesions that attack mucous membranes. Copper sulphate may be used in solution, or in the solid state—as the latter it is perhaps more efficacious, and if applied in the following manner it will be found that very few syphilitic lesions of the mouth fail to be benefited by it, and that they heal up in a surprisingly short space of time. A good plan is to have a number of broken bits of copper sulphate, each one being held in a piece of split wood about the size of a thick pen-handle and secured there by a little adhesive strapping. One of these holders can be used on each case and then destroyed. The mucous patch or ulcer requiring attention should be first dried with a swab of cotton-wool and then thoroughly and persistently scraped with the solid copper sulphate, the rough surface of which will quickly remove any slough that may be present, often leaving a bleeding surface behind it. The application of solid copper sulphate in this manner is nearly painless during the operation, and there is no after pain, while the benefit to the lesions themselves is in most cases almost magical. The use of this salt in such cases as have been described certainly deserves a wider popularity than it seems to have met with up to the present. Copper sulphate may be used with equal success on ulcerations of the tongue or throat. Some of the local applications mentioned, particularly the acid nitrate of mercury, are very painful, and it may be as well to cocaineise the part before applying them.

Constitutional treatment in the secondary stage. The constitutional administration of mercury in some form may be taken as the fundamental principle underlying the treatment of the

secondary stage of syphilis. The character of this treatment will, of course, vary in the hands of different medical officers. Of late years the treatment by intramuscular injection of insoluble mercury has been gaining more adherents, and certainly this method of giving mercury seems especially suitable under service conditions. Whatever the manner by which mercury is given, there are certain precautions which should be taken, which are applicable to all cases, and which it may be advisable to point out before entering into a description of the various methods of administering mercury.

Precautions to be observed in subjecting patients to a mercurial course. The care of the mouth. One of the most important points to make patients attend to whilst undergoing a mercurial course is the proper hygiene of the mouth, and at the commencement of treatment patients should be persuaded to have all useless stumps and decayed teeth that cannot be saved extracted.

Any teeth that can be repaired should be filled by a dentist.

In the case of men who are sensible, and who can be relied upon to clean their teeth regularly, it may not be necessary to extract all their decayed teeth, for many of these may still have several years' life left to them. During a mercurial course patients should be got into the habit of using a tooth-brush and some simple tooth-powder several times daily, and particularly just before turning in at night. Teeth that have accumulated tartar on them should be scaled by a dentist, an operation that may have to be performed several times during treatment. Smoking need not be forbidden unless there are active lesions of the mouth present.

The body-weight. A valuable index in determining the progress made by syphilitic patients can be afforded by the body-weight.

Patients should be weighed before commencing a mercurial course and this should be done every week throughout the whole course of treatment, whether the patients are having intervals in their treatment or not. The increase or decrease of the body-weight, allowing of course for differences in clothing at different times of the year, is one of the most important guides to the constitutional progress of the patient, and is an important factor

in determining the frequency and amount of the dosage in each case.

The urine. Albumin in the urine may be syphilitic in origin, or due to mercurial treatment, or to previous organic or functional disease of the kidneys. In every case where mercury is given regular examinations of the urine should be made, particularly in cases where there is loss of weight or any other sign of ill health. If, whilst undergoing mercurial treatment, albumin be found in the urine of a patient whose urine was normal prior to the administration of mercury, the albuminuria may then be reasonably attributed to the effects of the mercury. In such a case the drug should be at once discontinued for a time, and only renewed after all traces of albuminuria have disappeared; then the recommencement of mercurial treatment may be cautiously proceeded with, with frequent urinary examinations. Pre-existent renal disease is not always a bar to treatment with mercury, but greater precautions must be taken in these cases and smaller doses used. Mercury given intramuscularly has been detected in the urine two months after this treatment has been discontinued.

Dietary precautions. When mercury is given by the mouth patients must be instructed to avoid articles of food which might bring on diarrhoea, such as fruit, indigestible vegetables, coffee, &c.

Abstinence from alcohol is important, but it is not usually necessary to enforce strict teetotalism; spirits are, however, distinctly harmful in cases of syphilis and should be forbidden.

Intestinal mischief must be eliminated before commencing mercurial treatment by the mouth, and in cases of recent dysentery, enteric, &c., mercury should be administered by some other method.

Definite dosage. Whatever the means by which mercury is given, an attempt should be made to secure definite dosage. Inunctions should be of fixed amounts, as also pills, solutions, and injections. Men should be made to attend regularly for their treatment, and should not be entrusted with a supply of pills, medicine, or ointment to be used at their own convenience.

TO ENSURE CONTINUANCE OF TREATMENT

In the navy, where men are subjected to frequent transferences from ship to ship, there are opportunities for avoiding treatment which may be taken advantage of by those who wish to do so, and it is not always that a case of syphilis undergoes a two years' course of treatment at the hands of the same medical officer.

It is, therefore, most important to adopt a definite system by means of which full particulars of each case of syphilis may be supplied to the medical officer of the ship, barracks, or hospital to which such a case is discharged, and to take all necessary steps that these cases do not escape recognition.

The following precautions should therefore be observed :—

(a) Men under treatment for syphilis must not be allowed to go to ships that do not carry medical officers.

(b) The medical history sheet of every man under treatment for syphilis should contain in the margin a brief outline of the disease, and its treatment up to date.

(c) A copy of the man's page in the private syphilis register should be sent direct to the medical officer under whose care the man will next come.

The syphilis register. This is a book the general scheme of which depends upon the individual medical officer who keeps it written up. Generally speaking, there is a private register in every ship for recording cases of syphilis, which is drawn up on the following lines :—Each man has a complete page to himself, containing an account of the signs and symptoms of the disease from the time it first came under observation, together with the date on which the disease was contracted. The rest of the page is ruled into columns, in which are recorded the treatment and dosage adopted, together with an account of any manifestations that develop during treatment. There are also columns for recording the weekly body-weight and condition of the urine. The number of cases of syphilis under treatment at a time, in even the largest type of ship, rarely exceeds thirty or forty, and the keeping of a syphilis register on the foregoing lines will be found to be a matter of very little extra trouble to the medical officer.

THE METHODS OF ADMINISTERING MERCURY CONSTITUTIONALLY
MOST COMMONLY EMPLOYED IN THE NAVY

Mercury is most commonly administered afloat by inunction, by intramuscular injection, and by the mouth. It is customary in the navy to subject syphilitics to a course of treatment lasting for two years, and the general consensus of opinion goes to show that this is a reasonable time to allow for a complete cure ; but, at the same time, there are many cases apparently completely and permanently cured by treatment carried out over a far shorter period, and again there are cases which require a longer course of treatment than two years. The average case of syphilis occurring in a healthy subject ought to be, and usually is, completely cured if treated carefully for two years from the commencement of the disease, and the following description of the methods employed in treating syphilis is intended to be applicable in each case to a two years' course of treatment.

Inunction. There is no doubt that, if carefully carried out, the method of inunction is a valuable means for introducing mercury into the system, and is extremely useful in cases where it is desirable to get a patient rapidly under the influence of the drug.

The material used for inunction may be a 10 or 20 per cent. oleate of mercury mixed with an equal quantity of lanoline, or the ung. hydr. as issued to the service may be employed.

A good formula for the preparation of an ointment for the treatment of syphilis by inunction is as follows :—

R	Ung. hydr.	.	.	.	.	40 grains.
	Lanoline	.	.	.	.	20 „
	Mix.					

This, amounting to 1 drachm, suffices for a single inunction.

Parke, Davis & Co. supply a preparation consisting of tablets for inunction and known as ' Mercurettes '. Each of these tablets contains 30 grains of mercury incorporated with 60 grains of

cacao butter. The tablets are scented and wrapped in silver paper.

Whatever the preparation selected consists of, an attempt should be made to issue it in amounts containing a known quantity of mercury for each inunction, thus securing for the patient an approximately definite dosage.

The technique employed in carrying out a course of inunctions of mercury is as follows :—

The patient should be warm, and, where possible, in front of a fire.

The site selected for inunction should be carefully washed, and also the patient's hands.

The process of inunction should never be left to the patients to carry out alone, and a trained member of the sick berth staff should always be in attendance to see that the treatment is properly carried out.

In some cases patients may be trained to rub one another. In the service afloat trained rubbers are not employed, and, indeed, their employment is scarcely necessary as each patient can be very soon taught the few rules that need be observed.

The preparation chosen for inunction should be slowly and firmly rubbed in with the palm of the hand until all greasiness of the skin has disappeared, and the rubbing should be continued until the amount of ointment issued has been used up.

The time generally taken to effectually perform each inunction is from 15 to 20 minutes.

The next day the skin of the part previously used for inunction should be thoroughly washed with soap and water, as well as the site selected for the next inunction.

The parts chosen for inunction should be distributed as far as possible over various portions of the body, and no two inunctions should be administered consecutively at the same spot. It is advisable to have a regular routine in this connexion, thus :—

On the first day the inunction may be performed in one groin, on the second day in the axilla of the same side, on the third day on the inner surface of the thigh on the same side, on the fourth day

in the groin of the opposite side, and so on, returning to the original site after six or seven days.

The best time at which to perform the inunction is at night, a quarter of an hour before the patient turns into his hammock, when he can wear special night clothing, the soiling of which will not signify and which at intervals can be specially washed. The treatment of a case of syphilis by inunction alone, to be efficient, should extend over a period of two years, and consist of several courses punctuated by intervals of rest from treatment. Thirty or forty successive inunctions are sufficient for each course, and this number may be reduced according to the length of time that the total treatment has been continued, and according to the progress of the patient.

Intervals of rest from treatment from a month to three months' duration should be observed between the courses of inunctions. The length of these intervals will also depend upon the individual reaction and progress of each patient and upon the amount of treatment already received. As with the other methods of giving mercury, a temporary cessation will be required in cases of threatened mercurial stomatitis, &c.

The treatment of syphilis by inunction of mercury as has just been described is undoubtedly effectual, and patients can be rapidly brought under the influence of mercury by this method ; it is a useful form of treatment therefore in such cases, for instance, as iritis and phagedaena, or as a temporary change from other methods of treatment, or where other forms of treatment are contra-indicated.

The treatment of syphilis by inunction is scarcely suitable for carrying out a long mercurial course in dealing with sailors afloat, and the following are the chief reasons why this should be the case :—

1. Patients cannot be relied upon to perform their inunctions zealously over a long period, as the treatment is troublesome, and as it takes from ten to fifteen minutes to perform properly it sooner or later becomes irksome. A tendency to relax the thorough rubbing in of the mercurial ointment is especially noticeable amongst men in whom the active and objective signs of syphilis

have disappeared, who are attending for treatment whilst performing their full duties.

2. For the foregoing reasons it is therefore necessary to have all inunctions performed under the supervision of a trained and responsible man—thus taking up a large part of the time of at least one of the sick berth staff, which, in the service afloat, is reduced to the minimum consistent with fighting efficiency. Of course in the naval hospitals it may be more practicable to carry out the treatment of syphilis by inunctions, but even in these institutions the inducements offered to the patients and to the members of the sick berth staff responsible for seeing the treatment carried out are not sufficient to ensure unflagging zeal.

3. The amount of mercury absorbed as the result of inunction cannot be estimated as accurately as is the case where mercury is given by injection, when definite dosage can be employed.

4. The administration of mercury by inunctions is not a cleanly method, necessitating much washing and the wearing of special apparel. For the former the bluejacket begrudges the time, and for the latter his wardrobe is too limited.

By intramuscular injection. Of late years the method of administering mercury constitutionally by means of intramuscular injections has been adopted in the navy with good results. By this means the soluble or insoluble salts of mercury can be introduced into the system, or mercury itself in the shape of the, now familiar, mercurial cream can be injected.

Many objections have been raised against the treatment of syphilis by this plan, and there are still some medical officers who refuse to adopt this method of administering mercury to their patients. In actual practice, when metallic mercury is used in the form of mercurial cream, and where proper precautions are taken such as will be described, the objections to treating syphilis by intramuscular injections are so slight as to be almost negligible, whilst the advantages of this method of giving mercury are very great.

The treatment of syphilis by the injection of the soluble salts of mercury. In the navy the soluble salts of mercury are but little used in the treatment of syphilis, their use being chiefly confined

to temporary courses of treatment under circumstances where it is required that the therapeutic effect of mercury should be manifested as speedily as possible. Considering that the same effect will be almost, if not quite, as quickly produced by inunction, it is difficult to demonstrate the advantages that can be claimed for this particular method of administering mercury. Of the many soluble salts of mercury that have been experimented with in naval practice the most commonly used have been the benzoate, cyanide, succinimide, biniodide, and the perchloride. The perchloride of mercury is perhaps the most frequently used, and doses of not more than $\frac{1}{5}$ of a grain at a time should be administered in 10 or 15 minims of solution. The solution should preferably be saline, as the addition of salt is supposed to diminish the pain associated with these injections.

A comparison of the advantages and disadvantages of administering the soluble salts of mercury systematically by means of injection, either hypodermically or intramuscularly, shows that this form of treatment is not suited for the cure of syphilis—amongst our sailors at any rate. There can be no doubt, however, that mercury given in the soluble form by injection does exercise a marked therapeutic effect, and that in a very short space of time, and as an occasional treatment for a short period, it is capable of producing a very beneficial effect on the progress of syphilitic lesions. The following is a comparison of the advantages and disadvantages that are noticeable in connexion with the use of soluble salts of mercury by injection :—

Advantages :—

1. The injections give very little trouble in their administration, and as the fluid can be introduced hypodermically or intramuscularly it is not necessary to be extremely particular as to the site selected for injection. The salt being in solution is always ready for use, and there is no difficulty in filling the syringe and injecting the material.

2. The effect produced by the introduction of mercury in solution in this manner is very marked, and most syphilitic lesions quickly improve under the treatment.

Disadvantages :—

1. The smallness of the dose of mercury consistent with safety that is contained in each injection necessitates the frequent administration of these injections ; indeed, so transient is the action of these small doses that it is necessary in most cases to inject the salt every second day. The frequency of these injections is in itself a serious bar to treating the bluejacket by this means, as it is difficult enough to get men to submit to a single injection a week, and the men are not always available for injection unless at the expense of their duties.

2. The pain, which is an almost constant feature in association with the injection of the soluble salts of mercury, is another very important factor in determining the unpopularity of this treatment amongst sailor patients. The pain is sometimes very severe, and may temporarily disable men from the performance of their duties.

The treatment of syphilis by the intramuscular injection of insoluble mercury. This is a means of introducing mercury into the system which is now widely employed by naval medical officers. In skilled hands this method of treatment, rationally employed, has been found to yield the most gratifying results, and having regard to the conditions peculiar to naval life, where, too, patients are under disciplinary control, this form of treatment seems eminently suitable, and possesses advantages over other methods of administering mercury constitutionally. A comparison of the advantages and disadvantages of the treatment of syphilis by intramuscular injections of insoluble mercurial preparations will be found in vol. ii, p. 286. Metallic mercury to be used for injections requires to be introduced in a state of extremely fine molecular division, and so various vehicles have been used for its suspension. Until recently the mercurial cream issued to the service afloat has been prepared from the following formula :—

R	Mercury	.	.	.	.	2 parts by weight.
	Lanoline	.	.	.	.	14 „ „
	Paraff. molle					} to 20 parts by weight fluid.
	Alb. carbol. 2 per cent.					

10 minims of this cream contain 1 grain of metallic mercury.

This preparation was issued in small glass-stoppered jars and was of the consistence of butter. The amount required for a number of injections could be removed from the jar by a glass rod, and then slightly heated in some receptacle such as a small ointment pot until the right degree of melting for purposes of injection had been attained.

A better form of mercurial cream has since been brought out, and is now in general use. This cream has the advantage of containing the maximum amount of metallic mercury suspended in the minimum of vehicle, and is prepared from the following formula :—

R	Mercury	.	.	.	.	20	parts by weight.
	Lanoline anhydr.	.	.	.	.	30	„ „
	Chlorbutol	.	.	.	.	2	„ „

Paraffin liquid to 100 parts by measure.

5 minims of this cream contain 1 grain of mercury.

The cream is prepared by rubbing the mercury with a portion of the lanoline until no globules of mercury can be seen in the mixture with a hand microscope ; the remainder of the lanoline is then rubbed in. The cream is finally diluted, after gently heating, to the proper volume with liquid paraffin in which the chlorbutol has previously been dissolved. The mercury, lanoline, &c., are all carefully purified before mixing, and aseptic precautions are taken throughout the whole process of preparation.

A good mercurial cream should combine the properties of containing mercury in as fine a state of molecular division as possible, with as little foreign substance in the shape of vehicle as possible, and it should further be of such consistence as to remain thoroughly mixed in ordinary climates, and require but the slightest heating, if any, to render it capable of passing through the needle.

The syringes used for injecting mercurial cream should be made entirely of glass. The first pattern of service syringe for this purpose was made up of three component parts—the barrel, nozzle, and plunger—and these syringes are really very good and are still largely in use. A slightly improved form of syringe has lately been issued, also of glass, but in this syringe the nozzle

and barrel are all in one piece, and the whole syringe is slightly stronger, and of larger capacity (40 minims). The plunger of this syringe is made of stained glass which can readily be seen through the transparent barrel at whatever position it may be in, and the index on the syringe is thrown into relief by the opposite side of the barrel being also stained.

Before and after each batch of injections these syringes should be boiled in water, which should be cold when the syringes are put into it and then gradually raised to boiling-point. Before use the syringes may be rinsed out with rectified spirit, but it is not necessary to boil or rinse them between each injection.

The needles used for mercurial injections have always been made of a combination of platinum and iridium of about the length of an ordinary hypodermic needle, or slightly longer and with a larger bore. Recently, however, it has been proved that mercurial cream has no corrosive effect upon steel, and so steel needles are now largely used. Steel needles are much better for mercurial injections, as the part that fits into the nozzle of the syringe and the needle itself can be made in one piece, which is a great advantage. The steel needles, too, are stronger and last longer than the platino-iridium needles. Of course the soluble salts of mercury will cause erosion of steel needles, and so platino-iridium needles should be used when injecting mercurial solutions.

Whatever substances the needles are made of, they require sterilizing between each injection, and this is best done by putting them into boiling olive oil. On board ship the needles may be boiled in oil in a common test-tube held over a spirit lamp, or they may be boiled in oil in a small porcelain or platinum receptacle mounted on a stand over a spirit lamp. The needles may be picked out of the boiling oil by a forceps, or by means of a piece of silk thread tied round their bases, and, if too hot to use, they can be cooled by dipping them into a weak solution of carbolic acid.

The following is a description of the weekly routine and technique of examining, recording, and injecting patients receiving treatment by the intramuscular injection of mercurial cream :—

Every syphilitic case is made to come up for inspection once a week, irrespective of how long he has been under treatment,

and at these inspections the surgeon examines the mouth, throat, and skin. The weight and progress of the patient are then noted and compared with that recorded in previous weeks, from which a decision is arrived at as to what treatment and dosage are required. This examination can be rapidly performed, and if a patient is found to present any active lesions he is at once put on the sick-list until they are healed. This is done not so much because such a man might be unfit for the performance of his duty, but in order that the risk of the spread of contagion to healthy people may be minimized, and in order that he may be available to receive proper local treatment and remain under supervision.

The technique involved in injecting intramuscularly the soluble salts of mercury or mercurial cream is the same in each case, with the exception of course of the stirring of the cream in the case of the mercurial cream. The injections are conducted in the following manner :—

The site chosen for injection is in nearly all cases the upper and inner third of the gluteal region, and no two injections should be administered consecutively on the same side. Where for any reason the gluteal region may not be available, or where this particular region is objected to by the patient, other points for intramuscular injection are the erector spinae muscles in the lumbar region or the deltoid muscles. The selection of a site for injection is important, and that part of the buttock already mentioned has been proved by experience to be the most suitable in that it offers a sufficient amount of muscle substance as well as freedom from nerves and blood-vessels. Another important reason for choosing the upper and inner part of the buttock is that the spot selected is high enough to avoid being pressed upon or rubbed when the patient sits down or performs ordinary movements. Many of the cases of indurations and abscesses that have occurred in connexion with intramuscular injections of mercury have been due, not only to faulty technique, but also to injecting too low down, and in promiscuous parts of the buttock which were later subjected to friction, or some other kind of irritation. Injections may be made into the buttock with the

patient standing upright, but the best and safest position for the patient is lying face downwards on a couch.

The preparation of patients for injection. Each man is made to drop his trousers to the knees, and roll up his flannel and jumper to the waist. The skin of the site selected for injection is first washed with soap and water and a pad of lint soaked in carbolic lotion is retained over the part. The man, holding the pad in position with one hand, is then sent in to the medical officer, who rubs the skin of the part energetically with a gauze swab wrung out of rectified spirits. This rubbing of the skin with rectified spirit has for its object the removal of dead, and possibly infected epithelium, and is a measure which should not be omitted, as it must be borne in mind that even with the small-bored needles used it is probable that in most cases a minute piece of skin is carried through the tissues into the spot where the material injected is discharged. The rubbing should be brisk enough to produce a blush over the part.

The cream should be energetically and continually stirred to ensure thorough mixing, and to prevent the mercury separating out and sinking to the bottom. The stirring is best performed by means of a glass rod which has previously been passed through the flame of a spirit lamp to ensure the destruction of any germs or filaments of cotton, &c., which might be adhering to it. The cream should not be very liquid, but should be sufficiently fluid to pass through the needle with but slight pressure of the piston. It is impossible to keep the ingredients stirred in their proper proportions if the cream is allowed to become very fluid.

Syringe and needle. Care must be taken that the parts of the syringe fit together properly, and that the needle is securely adjusted, or else the force of the injection may cause them to be shot apart—an accident which, though not serious in itself, results in delay. If there are many cases for injection it is as well to employ two needles and two syringes, and a spare needle should be kept in readiness in case of an accident to one of the others. One needle can be left in the boiling oil while the other is being used, and one syringe can be filled whilst the other is employed. The syringe should be filled before the needle is at-

tached, and then, having attached the needle, a little of the cream should be pressed through it, and the drop of cream which exudes from the point of the needle should be removed by dipping the end of the needle—still attached to the syringe—into the boiling oil. Particular care must be exercised to keep any trace of the mercurial cream from adhering to the outer surface of the needle, as if mercurial cream is introduced along the track of the needle it may give rise to great pain—often lasting a considerable time. If, after dipping the needle in the oil, it is considered advisable to wipe it free of oil as some surgeons do, care must be taken to avoid using anything fluffy, such as lint or wool, for the purpose, as the introduction of filaments of cotton, &c., along the track of the needle may give rise to painful indurations, or septic trouble.

The technique of injecting. Placing the left hand lightly on the buttock, the needle, with the syringe attached held in the right hand, should be plunged up to the hilt with one quick thrust into the flesh at right angles to the skin surface. To be on the safe side the syringe should be detached from the needle for a few seconds before proceeding with the injection in order to notice whether any blood oozes out of the needle, which would point to a blood-vessel having been punctured and necessitate the removal of the needle and its reinsertion at some other point. This removal of the syringe is, however, quite unnecessary where the operator confines his injections to a certain known area such as has been described, and which experience will soon show him to be free from blood-vessels that are liable to puncture. The operator, having again attached the syringe, must not press the plunger until he is quite satisfied that the point of the needle is embedded in actual muscle-substance, as it is to the neglect of this precaution and the consequent deposit of some of the mercurial cream in the subcutaneous tissues that the development of painful indurations is often attributable. The operator must be on guard against the possible breaking of the needle by a sudden movement of the patient. The cream should be slowly injected by a steady pressure of the plunger; when the requisite amount has been injected, the hand should be removed from the buttock, and then the needle and syringe

may be sharply removed. In removing the needle care must be taken, for the reasons already given, to release the pressure from the plunger. Sometimes a little blood exudes from the puncture made by the needle ; it is of no consequence, and usually amounts to only a drop or two. In all cases the puncture in the skin should be sealed, and this is best done by cementing the opening with collodion and a small piece of gauze. A man who is not on the sick-list can be sent straight back to his duty as soon as he has received his injection, and when properly performed these injections should not interfere in any way with the discharge of the man's duty, of whatever nature it may be.

It must not be forgotten that patients who are receiving mercurial treatment by intramuscular injections must be allowed intervals of rest at certain periods for treatment, as, after a time, the mercury tends to accumulate in the system, and in some cases seems to exercise no further therapeutic effect. Experience proves that mercurial cream—for instance a dose containing $1\frac{1}{2}$ grains of mercury—is slowly absorbed, taking about seven or ten days to disappear. It has been proved, too, in cases where a number of injections have been given consecutively, that the elimination of mercury from the system is very slow, and traces of mercury have been found in the urine as much as two months after the injection has been given. The danger, then, of allowing too much mercury to accumulate in the system—that is, more than can be got rid of by the proper channels—is the chief reason why the intervals of rest from mercurial treatment are a necessary part of the course of treatment.

The medical officer should therefore have some general plan of treatment, consisting of periods of injections punctuated by intervals of rest. It must be remembered, however, that each case should be treated on its own merits, and the habit of treating all cases by the same hard and fast routine should be avoided.

During these intervals of rest from mercurial treatment, patients should still continue to attend for weekly inspections, and tonics and iodide of potassium may be prescribed in cases where such are indicated. Many surgeons give iodide treatment to all their syphilitic patients during these intervals. The following

is a scheme suggested for the treatment of a case of syphilis by intramuscular injections of mercurial cream alternating with periods of rest, and the whole is intended to cover a period of two years, starting from the commencement of the disease :—

6 weeks.	6 injections, one a week, each equivalent to 1½ grs. of mercury, equals 9 grs. mercury.
8 „	interval, with tonic and iodide treatment if necessary.
8 „	4 injections, one fortnightly, each equivalent to 1 gr. of mercury, equals 4 grs. mercury.
12 „	interval as before.
8 „	4 injections, one fortnightly, each equivalent to 1 gr. of mercury, equals 4 grs. of mercury.
12 „	interval as before.
8 „	4 injections, one fortnightly, each equivalent to 1 gr. of mercury, equals 4 grs. of mercury.
12 „	interval as before.
9 „	3 injections, one every three weeks, each equal to 1 gr. of mercury, equals 3 grs. of mercury.
9 „	interval as before.
12 „	4 injections, one every three weeks, each equivalent to 1 gr. of mercury, equals 4 grs. of mercury.
<hr/>	
Total, 104 weeks	25 injections, equivalent in all to 28 grs. of mercury.

Calomel cream is very often used, particularly at the commencement of a course of treatment, where it is desired to get the patient rapidly under the influence of mercury. For a long time calomel has been recognized as by far the most potent salt of mercury and the one that is capable of exercising the most marked therapeutic effect, but the severe pain so frequently attending its administration by injection has always been a serious drawback to its use in the treatment of syphilis. This objection has, however, now been overcome by Colonel F. J. Lambkin, R.A.M.C., who has prepared a cream containing calomel the injection of which does not give rise to pain. This calomel cream is dispensed by Messrs. Oppenheimer, and the following is the formula used in its preparation :—

R	Calomel	5 grammes.
Equal parts of absolute creosote and camphoric acid }	Creo-Camph.	20 c.c.
	Palmitin basis	to 100 c.c.
	10 minims contain ½ grain of calomel. Melting point 37° C.	

The treatment of syphilis by the intramuscular injection of insoluble mercury is now largely employed by naval medical officers, and, like most forms of treatment, it has its disadvantages as well as its advantages; fortunately the latter very much outweigh the former.

The following are some objections that have been brought against this method of treatment:—

1. Cases have arisen where the mercury, having apparently remained unabsorbed at the site of injection for some time, has then taken effect on the patient in such excess as to produce grave symptoms of mercurial poisoning.

Such a condition as this ought not to occur where careful dosage is employed and where the injections have been made into actual muscle substance; more often than not, the cases of mercurial poisoning which do occur are due to unsuitable doses of the drug, or to not injecting into the muscle. In the latter case the material injected frequently becomes encysted in the subcutaneous tissues, and later on may take on a cumulative action in conjunction with other injections administered in a like manner.

2. The patients themselves may offer objections to this line of treatment on the grounds of pain, or because they do not understand the rationale of the treatment.

Such objections can nearly always be overcome by a few tactful words of information to each patient; in actual practice very few men fail to submit to this form of treatment after its advantages have been explained to them. As to the pain of the injections it is so trivial, unless the injection is attended by some complication or carelessly performed, that it scarcely needs mention. It is usual for a sensation, that may be likened to a bruised feeling, to develop some twelve hours or so after each injection. This sensation can scarcely be called pain; it is generally only elicited by pressure, and usually disappears in a day or two.

3. The risk of thrombosis, embolism, abscess, &c.

By adopting a particular site in which to inject, which has already been mentioned, and by first inserting the needle without

the syringe attached, we can be certain of our ground and the risk of damaging blood-vessels can be practically abolished. Abscesses are the result in nearly all cases of carelessness on the part of the operator and want of thoroughness in the aseptic precautions adopted; they are therefore quite preventable. (N.B.—The skin puncture made by the needle should always be covered by a piece of sterilized gauze cemented on by collodion.)

4. Trouble and time taken in making preparations for, and administering, the injections.

It is possible with but two assistants to inject at least thirty men in an hour. This time includes the sterilization of the skin, the sterilization of the needles and syringes, the individual examination of the patients, and the recording of their particulars. The weighing of the patients is done before they are inspected, and a little extra time should be allowed for this.

5. Want of reliable assistants.

This is not an insurmountable objection, for any steward or attendant of average intelligence can be thoroughly trained in his duties in connexion with this treatment in a very short time.

It is difficult to find any more objections to add to the above list, and accordingly the advantages of this treatment can now be given :—

1. The patients need only receive treatment at most on one day a week.

2. A definitely known dose is administered to the patient by the surgeon himself.—This is a point of great importance in a service like the navy, where one has to contend with the prejudices and carelessness of the patients.

3. The patients can be rapidly brought under the influence of mercury, and many syphilitic lesions—for instance, some of the so-called ‘reminders’—are more speedily influenced by mercury given by injection than where the drug is administered by other methods.

4. The saving in expense by adopting this line of treatment is very great, as the amount of mercury used is far less than is the case where mercury is given by inunction or by the mouth.

Some sequelae which may occur as the result of intramuscular

injections of mercurial creams. It is to be expected that a foreign substance such as mercurial cream will give rise to some inflammatory reaction when introduced into the substance of a muscle, and as a matter of fact a certain amount of inflammation always does occur in muscle as the immediate result of the deposition of mercury in its substance. Fortunately, this inflammatory reaction is usually short-lived and insignificant, unless when associated with septic infection, in which case serious trouble may ensue.

Pain, as a sequel to an injection, varies greatly in different individuals, and in the majority of cases is so slight as to be negligible. In most cases in about twelve hours a feeling as of a bruise develops at the site of injection; this sensation is generally only elicited when the part is subjected to pressure and passes off in a day or two. It is as well to warn patients of the likelihood of the development of this sensation, as otherwise they may fancy something unusual has happened. Occasionally, as a sequel to an injection, a patient complains of twinges in the leg, or of a sensation of numbness in parts of the thigh and leg; these sensations follow the course of the sciatic nerve, and are probably due to pressure upon some small filaments in connexion with it. The pain, if it can be so called, in these cases, generally passes off in the course of a couple of days without any particular treatment.

A more severe form of pain is that which marks the presence of an induration, and in extreme cases men suffering from these indurations have to be put on the sick-list, or at least excused certain duties, such as boat-pulling and physical drill. Indurations are caused by excessive inflammatory reaction occurring around an injected deposit of mercury which, instead of undergoing gradual absorption, becomes encysted. These indurations are usually, though not always, the result of faulty technique, and are generally due to the mercury finding its way into tissues other than the muscle it was intended for. The varieties of induration may be classified into superficial and deep. The former occur as the result of the injection of some of the mercurial cream into the subcutaneous tissues, and can be felt as little hard nodules

situated just under the skin, which may be dispersed by massaging the part briskly.

The deep-seated indurations can also be felt, when the buttock is firmly grasped, as hard tense nodules, and it is difficult in most cases to account for them. These indurations are probably due to the introduction of foreign matter besides the mercurial cream, such as particles of dust or fluff, or they may be due to the deposition of the mercurial cream in the intramuscular fibrous and fatty tissues. Sometimes the whole buttock is uniformly swollen as the result of one of these indurations, and the gluteal fold may be obliterated, often simulating abscess formation, though the absence of irregular temperature, oedema, and local redness and heat will all show that the trouble is really of a non-septic nature. I have notes of at least two cases that have occurred under my own observation where large painful swellings of the buttock occurred—in each case some six or seven weeks after the last injection had been administered. Another curious feature in these cases was that the induration and swelling developed in each case when the patient was in bed on the sick-list suffering from some entirely different complaint. The treatment of these indurations consists in massage of as vigorous a nature as possible consistent with the patient's ability for bearing pain. In any case the pain produced by massage very quickly passes off. An induration must be looked upon as an encysted dose of mercury that has been prevented from exercising its therapeutic effect, and accordingly, if a patient's syphilis is in such a state that the immediate influence of mercury is necessary, the drug should be given by some other method—such as by inunction, or by the mouth—either of which forms of treatment can be discontinued as soon as the induration has become absorbed. Abscesses in connexion with intramuscular injections are not often seen, and when they do occur are usually due to inadequate antiseptic precautions. These abscesses may be superficial, resembling a boil, and may require similar treatment, or they may be deep seated in the gluteal muscles, in which case an operation under a general anaesthetic will probably be necessary for the cure of the condition.

The administration of mercury by the mouth. This method of treating syphilis has long been the most popular, and in suitable cases, with appropriate dosage, it has proved itself to be most efficient and to possess several advantages, of which the following are a few :—

1. Mercury given by the mouth is an easy, painless, and cleanly method of administering the drug.

2. Given in small and frequent doses it exercises its maximum effect with the minimum of constitutional harm to the patient.

3. With the exception of prescribing for each patient the medical officer is not required to give up any of his time to this form of treatment.

4. No supervision of the patients is required other than seeing that each man swallows his dose at the prescribed times. (Of course patients receiving mercury by the mouth are made to attend for the weekly inspection common to all under treatment for syphilis.)

The following are some of the most commonly prescribed preparations of mercury for oral administration :—

Hydrarg. c. cret., 1 to 2 grains every two, three, four, or six hours according to the special needs of the case, with or without pulv. ipecac. co. in from 1 to 5 grain doses.

Tannate of mercury, $\frac{1}{2}$ -grain doses in pill form every two or three hours.

Mercurous iodide, in $\frac{1}{6}$ to $\frac{1}{4}$ grain doses every one or two hours.

Green iodide of mercury, in $\frac{1}{4}$ to $\frac{1}{2}$ grain doses three or four times daily, and with or without extract of opium in $\frac{1}{4}$ -grain doses.

Liquor hydr. perchlor., in 3 ss to 3 j doses, three or four times a day.

Liquor arsenii et hydrargyri iodidi (*Donovan's solution*) may be given in from 5 to 20 min. doses. The so-called *biniodide mixture* is a favourite method of giving mercury and iodide of potassium together. The following is the usual formula :—

R	Liq. hydr. perchlor.	.	.	.	.	3 j
	Potass. iodidi	.	.	.	.	gr. v.
	Ammon. carb.	.	.	.	.	gr. iv.
	Infus. gentian. co.	.	.	.	.	ad 3 j.

1 ounce thrice daily.

In giving mercury by the mouth it is better to administer small and frequent doses than fewer and larger amounts; thus if 6 grains of hydr. \bar{c} cret. are considered necessary per diem for a particular case, it is better to give 1 grain at a time at six regular intervals than to give 2 grains three times a day. Even 3 grains a day may be divided into six $\frac{1}{2}$ -grain doses.

In treating a patient for a period of two years with mercury given by the mouth, the question arises as to whether intervals of freedom from mercurial treatment should be insisted upon, as is done when mercury is given by injection or inunction. Opinions differ on this point, but most medical officers allow their patients to continue their pil. hydr. \bar{c} cret. 1 grain t. d. s., or whatever it is, right up to the end of the two years' course unless special circumstances contra-indicate such treatment.

It will be found that mercury given by the mouth, in small doses as already advised, will in most cases agree with the patient, and may be safely continued—in moderate amounts—throughout the whole two years' course without any intervals from mercurial treatment being necessary. Thus a course of treatment may be commenced with six 1-grain doses of hydr. \bar{c} cret. daily for the first two or three months until the special manifestations of the case have cleared up, when the dose of hydr. \bar{c} cret. may be reduced to 1 grain three times a day and continued at that right up to the last. The disadvantages of the oral method of administering mercury from the naval surgeon's point of view may be summed up as follows :—

1. It is often found that, however conscientious a patient may be at first about taking his medicine at the prescribed times, he will sooner or later neglect to carry out his treatment—more particularly is this the case when the objective manifestations of the disease have disappeared. The bluejacket certainly cannot be trusted to swallow pills or medicine for two years unless under compulsion, and constant supervision is necessary, to the extent even of watching that patients do not spit out or throw away their medicine.

2. The actual dose of mercury absorbed by the system is never definitely known, and more or less of the mercury swallowed

by the mouth passes through the digestive tract without exercising any constitutional therapeutic effect.

3. There are cases where the administration of mercury by the mouth does not seem to influence sufficiently the particular manifestations of syphilis for which the drug is given.

4. The prolonged administration of mercury by the mouth tends in some cases to produce chronic intestinal trouble and cachexia.

5. Mercury given by the mouth is not suitable for patients who have been the subject of recent dysentery, or of some of the tropical diarrhoeas ; neither is it suitable for patients suffering from malarial cachexia whose stomachs may have to stand other medicines and tonics as well.

6. Given by the mouth, mercury in a large number of cases produces diarrhoea, which is a condition most earnestly to be avoided in the continuous treatment of syphilis by this drug. To prevent this diarrhoea, besides the addition of drugs such as pulv. ipecac. co. (in themselves harmful to the constitution) dietary restrictions have to be laid upon the patients. Now there is nothing more difficult than to persuade the bluejacket to give up his vegetables, his coffee, or his beer. In a hot climate where fruit is abundant and cheap, it is absurd to expect the sailor to deny himself the luxuries that he sees his shipmates indulging in ; the result is that in a great many cases diarrhoea is induced and the man blames the mercury and wants to give up taking it.

The administration of mercury by the mouth in cases of syphilis where the patients are intelligent and trustworthy men who can be got to realize the gravity of their disease and the necessity of religiously carrying out their treatment, such men as can be relied upon to take their medicines as ordered, is a most efficient method of treating the disease and one which gives the medical officer and the patient very little trouble.

Unfortunately the men who can be trusted to pay attention to their treatment and take their mercury regularly, compose a very small minority compared with the large majority who have to be practically compelled to undergo their prescribed

treatment, or, at any rate, cannot be trusted to continue their treatment without the strictest supervision.

Local treatment during the late or tertiary stage of syphilis.

The manifestations of syphilis associated with the later stages of the disease, whether they are deep seated or superficial, are usually of a gummatous nature, and when superficial and palpable can generally be treated locally. Of course, as in the earlier stages of the disease, local treatment in the tertiary stage must be accompanied by constitutional treatment. A superficial gumma, which has not broken down, usually requires no further local attention than protection by some form of pad or bandage, particularly where it is situated in a position exposed to injury, such as on the shin.

Where the gummatous process has taken on an ulcerative action the local dressings should be of a dry antiseptic nature, and iodoform and gauze may be used for this purpose.

Local injections into gummatous growths, or into the tissues around them, have been tried, and in a few cases with some success, the injection consisting of an aqueous solution of iodide of potassium.

A gummatous testicle is often benefited by strapping. The tincture or liniment of iodine may be painted on the skin over subcutaneous gummata. Formerly it was considered inadvisable to incise a gumma, but now, with aseptic precautions, a gumma that has broken down and degenerated may be freely incised and its contents—usually a thin blood-stained discharge—evacuated, and some antiseptic dressing applied.

Constitutional treatment in the tertiary stage. Iodine in some form is the most valuable drug we have at our disposal in the constitutional treatment of the manifestations of the late stages of syphilis, especially when the administration of the iodides is carried out in association with the exhibition of mercury constitutionally. Even in cases where the iodides, *per se*, appear to effect a cure, and cause the disappearance of the conditions for which they were administered, it is none the less advisable to combine mercurial treatment with them. Mercury and the iodides may be given simultaneously or alternately.

Iodine in the form of iodide of potassium is the most popular, and when given in properly regulated doses is a very effectual drug in the treatment of most tertiary affections. Iodide of potassium produces the best results when given in gradually increasing doses for a short period at a time; aromatic spirits of ammonia should be given with it to counteract the somewhat depressing action of the iodide, and each dose should be largely diluted. The following is a method of prescribing iodide of potassium largely used in the navy :—

R	Potass. iodid.	.	.	.	.	.	gr. 5
	Spt. ammon. aromat.	.	.	.	.	.	℥ 10
	Aquam ad	.	.	.	.	.	℥ j

three or four times a day after meals and followed by a draught of half a pint of water.

This is prescribed for the first day; the second day iodide of potassium is given in 10-grain doses, the third in 15-grain doses, the fourth in 20-grain doses, and the fifth in 25-grain doses. There is then an interval of from three days to a week, at the conclusion of which treatment is recommenced, beginning with 5 grains as before.

The total length of the treatment by graduated doses of iodide of potassium will of course depend upon the progress of the case and also upon the individual idiosyncrasy of the patient to the drug. Some patients can stand enormous doses of iodide of potassium, whilst in others very minute doses will produce symptoms of iodism. Iodism in some cases will disappear on doubling or trebling the dose, but in other cases the surgeon will have to be satisfied with giving the patient the maximum dose he can bear without producing iodism, be it ever so small. I know of one patient who has progressed most satisfactorily with $1\frac{1}{2}$ -grain doses of iodide of potassium—more than that always brought on marked symptoms of iodism attended by great discomfort.

The tincture of iodine, iodoform in pills, iodide of potassium, and iodipin by injection are some of the other methods by which iodine has been administered in the treatment of syphilis. What-

ever way the drug is administered it has been proved that it is always excreted as iodide of potassium.

The use of iodipin in the treatment of late syphilitic affections has given good results; 25 grammes may be injected into the buttock daily. Iodipin can also be given by the mouth. Whatever the manner in which iodides are administered the occurrence of iodism is to be avoided as much as possible. Iodism in treating syphilis by the iodides, and diarrhoea in treating syphilis by mercury, are most undesirable accompaniments to a course of treatment, and both detract very considerably from the good effect that the drugs are capable of producing when given in properly regulated doses.

The treatment of syphilis by arsenical preparations. The beneficial action of arsenic in certain cutaneous disorders is well known to dermatologists, and in the treatment of syphilis this drug has long been in use. Until quite recently arsenic, when given in cases of syphilis, was prescribed in conjunction with iron in pill form as a tonic, in solution as Fowler's solution either separately or in conjunction with iron and quinine, or in conjunction with mercury and iodide in the form of the liquor arsenii et hydrargyri iodidi, or Donovan's solution. Though the well-known therapeutic action of arsenic in helping to clear up the obvious cutaneous manifestations of syphilis has long been fully recognized, there is as yet no proof that by the action of this drug alone the cure of syphilis can be brought about. The introduction of the arylarsonates in the treatment of syphilis had at first the effect of holding out the hope that we had another specific in the treatment of syphilis, and one, too, that might not require such lengthy courses of treatment as mercury. However, the brilliant results at first obtained were in many instances eclipsed by the severe relapses of the disease which followed later. The arylarsonates, atoxyl, soamin, and arsacetin, are administered by means of intramuscular injection, and all have been tried in naval hospitals and, in some instances, by medical officers afloat.

The consensus of opinion goes to show that soamin and atoxyl—which are practically identical except that soamin is more

stable in its composition—do not produce such good results as may be obtained from the use of arsacetin. There is also evidence that arsacetin is far less liable to produce those unpleasant symptoms and results, such as colic, dimness of vision, and even optic atrophy, which have been observed in some of the cases treated by soamin or atoxyl.

The method of giving intramuscular injections of these arsenical preparations is in most respects similar to that observed in dealing with intramuscular injections of mercury which has already been described. The injections are given every second day and each injection contains 10 grains in solution.

Ten injections (100 grains) constitute a 'course', and this may be repeated in three months' time and again in another three months.

Up to the present the treatment of syphilis by the intramuscular injection of arsenical compounds has not met with great success in naval practice, and, indeed, it is questionable if the fashion of administering arsenical compounds by intramuscular injection will always remain in vogue and be justified by the results it produces, or whether this treatment will gradually settle down and be relegated to certain selected cases where arsenic cannot be tolerated by the mouth. Whatever the manner in which arsenic is administered, there is as yet no evidence to prove that in this drug we have a specific likely to replace mercury in the treatment of syphilis, nor is it likely that syphilis will ever be satisfactorily treated and permanently cured by arsenic alone.

Where arsenic does most good in syphilitic cases is in the treatment of the later secondary cutaneous lesions and early tertiary manifestations; even in these cases arsenic alone cannot be relied upon to effect a cure.

It is in conjunction with, or at periods alternating with, the administration of mercury that arsenical treatment produces its best effect, and up to the present the majority of naval medical men are content to look upon arsenic as a valuable ally to mercurial treatment, but even then only to be used in suitable and selected cases.

THE GRANTING OF LEAVE PRIVILEGES TO SYPHILITIC
SUBJECTS

The time comes when a man's primary sore becomes healed up and he is apparently free from all objective manifestations of syphilis; the question then arises as to how soon such a man, whilst still receiving antisyphilitic treatment, may be given the usual shore-going liberty with safety to those with whom he may come in contact. How long syphilitic subjects receiving adequate antisyphilitic treatment remain capable of infecting healthy persons by contagion is a question that is not easy to answer. It is probable, however, that during the first six months, at least, of the course of a case of syphilis—even though undergoing continuous treatment—there is a strong likelihood of the disease being directly transmissible from the infected man to those with whom he may come in intimate contact.

In any case, irrespective of what time the disease may have lasted, the presence of any active lesions of the genitals, skin, or mucous membrane increases the chances of spreading the disease to healthy persons by contact, and so it should be a definite regulation never to allow shore-going liberty to any sailor suffering from active or unhealed syphilitic lesions. It would seem, therefore, that the ideal method of preventing syphilitic men from giving their disease to healthy persons would be to keep them confined to their ship or barracks for the first six months of the disease and keep them on the sick-list (when their leave is automatically stopped) as long as they present any active lesions. In actual practice, however, it comes unnecessarily hard upon a man suffering from syphilis, but free of objective manifestations of the disease, to have his leave stopped, and to be prevented from taking part in any shore-going pursuits for as long a period as six months. In many cases it is beneficial for these men to get proper normal exercise on shore apart from the exercise of their duty on board ship, and the curtailment of liberty in all cases for so long a period would undoubtedly cause resentment, and might possibly lead to attempts at concealment of disease.

The method of dealing with the question of granting leave

to syphilitic sailors in the Royal Navy that is at present customary may be summed up as follows :—

Men free from the objective manifestations of syphilis are given permission to go on shore on leave irrespective of how long the disease may have lasted, provided that the men are of good conduct. These men are all carefully instructed about their disease and warned about taking proper precautions against infecting those with whom they associate, and each man is appealed to individually not to indulge in sexual intercourse. Men of doubtful character in some cases may be given daily leave, but should not be granted the privilege of all-night leave. In any case it is more than probable that men of doubtful character will have their leave stopped for breaches of discipline quite apart from medical reasons. In connexion with the subject of granting leave to syphilitic men it must be remembered that all sailors suffering from syphilis are inspected once a week, and any cases that are found to be suffering from active lesions are at once placed on the sick-list, which entails the stoppage of their leave.

Charles R. Rushe

THE VALUE OF JUSTUS' TEST IN THE
DIAGNOSIS OF SYPHILIS

BY

STAFF SURGEON W. PERCEVAL YETTS, R.N.

CHAPTER XXXVII

THE VALUE OF JUSTUS' TEST

Definition of Justus' test. It has been shown that the blood in syphilis is peculiarly sensitive to a single large dose of mercury, administered in a form which can be rapidly assimilated, e. g. by inunction, intravenous or intramuscular injection. A considerable and rapid fall in the amount of haemoglobin takes place.

Justus stated that this decrease of haemoglobin, to the extent of 10 to 20 per cent., occurs within twenty-four hours in 70 to 80 per cent. of all cases of syphilis which show active manifestations of the disease. He claimed that this characteristic reaction never occurs in health or with diseases other than syphilis.

The mercury is best administered by the inunction of ung. hydrarg., and the quantity given should not be less than 3 grammes for an adult and 1 gramme for a child. The reaction does not follow when the drug is taken by mouth.

Historical. In 1895 Justus,¹ of Budapest, described in 'Virchow's Archiv' a new test for the diagnosis of syphilis. At the International Congress of Dermatology, in 1897, he presented a paper which reiterated and amplified his former announcement.² His statements were the result of investigations carried on during the previous five years upon more than 300 cases. A positive reaction was observed in all untreated cases of secondary, tertiary, and congenital forms of syphilis, and in thirteen out of sixteen cases in which only a fresh chancre and inguinal adenitis were present. The three cases of chancre which responded negatively were nearly healed.

In short, it was in florid cases with advancing lesions that the test was found to be positive.

As an example of the value of the test in differential diagnosis, Justus quotes a case of advanced pulmonary tuberculosis in a man who had contracted syphilis nine years previously. In order to diagnose whether an ulceration affecting the larynx was of

syphilitic or tuberculous origin the test was applied and found to be negative, a result confirmed later by the autopsy. A negative result occurred in 'very numerous' control experiments.

In addition to the points quoted in the definition above, Justus called attention to the following limitations to the test:—

This characteristic reaction may be observed as soon as the glands remote from the point of inoculation are affected, and in all subsequent stages of the disease. The reaction disappears whenever the signs of syphilis show remission, but will reappear during every relapse of the malady.

He also mentioned that the decrease in haemoglobin following the administration of mercury will be restored sooner or later in proportion to the gravity of the syphilitic manifestations and the general state of nutrition. Repeated administrations of mercury may cause corresponding falls in the amount of haemoglobin. Should mercurial treatment be continued, the haemoglobin will ultimately reach a much higher level than at the beginning of treatment. It was not claimed that this test was of value in cases under prolonged treatment nor in so-called latent cases.

Cabot and Mertins³ tried this test in forty-three cases. Seven of these patients were suffering from undoubted and active syphilis, and showed reductions in haemoglobin varying from 10 to 35 per cent., the average being 21 per cent. Three cases of suspected syphilis gave negative results, but being inactive did not fulfil Justus' requirements. Of the thirty-three control cases, but one gave a genuinely positive reaction, a case of chlorosis with a loss of 13 per cent. of haemoglobin. One patient with malaria showed a fall of 10 per cent., but this was attributed to a chill contracted just after the inunction. Inunctions of only 15 to 40 grains ung. hydrarg. were used by Cabot and Mertins in their investigations.

Jones,⁴ in 1900, published the results of his examination of fifty-three cases. Haemoglobin was estimated by the specific gravity method after 40 to 60 grains ung. hydrarg. had been rubbed in. Of these fifty-three cases, thirty-five were syphilitic. Seventeen cases of active syphilis gave thirteen positive results. One of these illustrates the type of case for the diagnosis in which Justus' test is especially valuable. The patient had a character-

istic mucous patch on the inner side of his cheek, but there was no history of chancre and the possibility of infection was denied. However, marked improvement after ten days of mercurial treatment justified the diagnosis of specific disease. Of the remaining syphilitics, two gave positive and fifteen negative reactions. Eight of these negative cases, however, were either latent or had chancre without adenitis, and therefore did not meet Justus' requirements. Eighteen control cases of various diseases were all negative.

Brown and Dale⁵ examined fourteen cases and decided that the test was unreliable.

Christian and Foerester⁶ investigated twenty-nine cases. Eight cases of syphilis showed a fall in haemoglobin of from 10 to 21 per cent. Two syphilitics, exhibiting too slight a reaction to be classed as positive, had been under continuous treatment for about two years. The remaining cases (twenty-one) gave negative results. Eleven of these were syphilitic, but all except one were of long standing, and had had considerable treatment. The control cases were negative, except one case of sexual neurasthenia, which showed a fall of 18 per cent.

Macphail⁷ published, in 1901, a paper recording the examination of twelve patients from a hospital for insane. Eight of these suffered from general paresis, two from dementia, one from melancholia, and one from delusional insanity. Three certainly had suffered from syphilis, and in the remainder syphilis was excluded in only two cases. All were negative to Justus' test. Campbell,⁸ in the discussion following the reading of this paper, pointed out that Macphail had not formed a right conception of Justus' test. He said that none of these cases could be described as exhibiting active manifestations of syphilis, since the symptoms of general paresis, &c., do not respond to the specifics for syphilis, viz. mercury or iodides. Campbell himself had tried the test with four cases of syphilis, and obtained a markedly positive reaction in one case. Two control cases of marked anaemia had been negative.

In 1903 Justus⁹ published another paper, reviewing the literature which had appeared on the subject, and reiterating his earlier statements. He explained the negative results obtained

by various observers as due to faulty technique, or because the test had been applied to unsuitable cases. He laid stress on the fact that a positive reaction can be expected only in a florid stage of the disease, a necessary sign of this condition in early cases being the presence of affected lymphatic glands distant from the point of inoculation. Further, that the test holds good in active secondary, tertiary, and hereditary forms of the disease, but disappears when the syphilitic affections begin to resolve. It reappears with relapses. With regard to technique Justus mentioned the following points:—

The mercury is best administered by the inunction of ung. hydrarg., and must be not less than 3 grammes for an adult and 1 gramme for a child. The haemoglobin estimation should be made on two consecutive days at the same hour in the day. In the case of mercury given by intramuscular injection, an estimation should be made eight to nine hours later. Justus advised the use of the Gowers-Sahli haemoglobinometer. He warned observers against using pressure to obtain blood for examination.

Buckmaster¹⁰ has recorded two cases which were positive to Justus' test.

Investigations by the writer. During the past two years the writer has applied Justus' test to thirty-eight cases, all of whom were adults. Ten cases of active syphilis, one of doubtful nature, twenty-one cases of various diseases, and six healthy persons were examined.

Technique employed. Estimations of haemoglobin were made by Hammerschlag's specific gravity method. In most cases a rough control was carried out by Tallqvist's haemoglobinometer. Mercury was administered by inunction, 55 grains of ung. hydrarg. being rubbed into both flanks for the space of twenty minutes. The ointment was applied directly after the haemoglobin had been estimated. Fifteen to twenty-four hours were allowed to elapse before the second estimation was made, care being taken to choose, if possible, similar conditions with regard to the patients' meals, baths, &c., for the two estimations. In some instances the test was repeated.

The positive results are arranged below in tabular form.

<i>No. of Case.</i>	<i>Nature of Case.</i>	<i>Per cent. decrease of Haemoglobin.</i>	<i>Remarks.</i>
1	Syphilis	30	Chancre and rash 4 years previously, when patient had treatment for about 1 month. Chancroids 10 months previously. No active symptoms now.
2	Syphilis	15	Gave a negative reaction when examined 3 months previously although he then exhibited typical chancre and erythema. Now ulceration of tonsils, alopecia, and general adenopathy are present.
3	Syphilis	8 20	Typical chancre the only symptom. This is the result of inunctions repeated on the two days following previous test.
4	Syphilis	30	History of chancre and rash 4 years previously, when patient had mercurial treatment for 2 months. Now suffers from severe headache.
5	Syphilis	20	Papulo-ulcerative eruption of 6 weeks' standing, which had been treated as non-specific. No history of syphilis, and denies possibility of infection. Subsequently eruption, after 3 weeks mercurial treatment, had nearly gone.
6	Syphilis	15	Patient had a large chronic ulcer on leg, where also were varicose veins. This ulcer had resisted non-specific treatment for 6 months. No history of syphilis and possibility of infection denied. Ulcer healed in 5 weeks under mercury and iodides.
7	Syphilis	10	Scars of two healed chancres. General adenopathy. Subsequently anal condylomata appeared.
8	Syphilis	15	Chancre 9 months previously. General adenopathy. Treatment for 2 months after chancre appeared.
9	Syphilis	None 12	Typical chancre the only symptom. This is the result 3 weeks later, when general adenopathy present. Mercurial treatment by mouth 4 weeks.
10	Chancroid	20	
11	Chancroid	18	

CASE 12. This case of mixed infection was examined twice. First when the chancroid was present, and four months later, when the patient had a typical hard sore on the site of the chancroid, a general erythema, and ulcerated tonsils. On both occasions the test failed to produce any reaction.

CASE 13. Of doubtful nature; history of general profuse confluent erythema three months previously, which disappeared during administration of mercury lasting one week. No history of chancre, no adenopathy, nor other symptoms. Now has inflamed tonsils. An increase of 8 per cent. haemoglobin followed inunction.

The remaining twenty-five persons showed no reaction or, in a few instances, slight increases in percentage of haemoglobin.

Cases of the following diseases were examined: chancroid

(5), gonorrhoea (7), balanitis (2), scabies (3), anaemia due to intestinal parasites (1), and neurasthenia (1). Six healthy subjects gave no reaction.

Summary of Writer's Results.—Of the ten cases of active syphilis examined, only one failed to react positively.

Of the twenty-seven controls, two cases of chancroid (Nos. 10 and 11) gave a positive reaction. It has not been proved that these two patients were not also infected with syphilis.

The test was of practical use in forming diagnoses affecting the treatment of Nos. 5 and 6.

Conclusions.—Since Justus' first announcement various observers have reported about 200 cases to which the test has been supplied.


Of the syphilitic cases only about fifty showed signs of active disease, and about 90 per cent. of these reacted positively to the test.

The statement that a positive reaction is never obtained with diseases other than syphilis was found to be untrue in two instances, viz. a case of chlorosis and one of neurasthenia.

Before a conclusion on this point can be arrived at, further studies of various forms of anaemia are necessary. The fall in haemoglobin in a case of malaria was attributed by the observers to a chill. Two cases of chancroid, examined by the writer, gave positive reactions, but with them the presence of syphilis has not been excluded.

Finally, from observed results it must be concluded that the test is of considerable value in diagnosis within the limitations described by Justus.

It is not valid, nor has it been claimed to be valid, in early cases where a doubt exists as to the nature of a chancre and before manifestations of general infection occur.


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